Canadian Overseas Exports of General Cargo and Port Activity in Eastern Canada

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CANADIAN OVERSEAS EXPORTS OF GENERAL CARGO AND PORT ACTIVITY IN EASTERN CANADA

(translation)

prepared by
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FOREWORD

The principal objective of this study is to examine, on a comparative basis, the hinterlands of the ports of Halifax, Saint John, Québec and Montréal. To this end, the study provides a detailed analysis of the Canadian domestic markets and the overseas markets served by each of these ports.

This study represents the first effort by the Research Branch of the Commission to carry out a thorough analysis of the total value of Canadian general cargo exports moving through Eastern Canadian ports. The report devotes particular attention to the various factors governing the economics of international shipping and to new requirements in the distribution of goods in order to explain the activities of each port.

Whenever possible, the Commission makes publicly available the results of its research endeavours and the present report is offered in line with this practice. The opinions expressed in this report are, of course, those of the author and do not necessarily reflect the views of the Canadian Transport Commission.

Yves Dubé
Vice-President
(Research)

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Moreover, this research could not have been carried out without the cooperation of Messrs. Marcel Lapointe and Roger Therrien, of the Systems and Data Dissemination Section, External Trade Division, Statistics Canada. They provided us, within the framework of a contract with the Research Branch of the Commission, the statistical base for the study. We offer them our thanks.

Nevertheless, the author assumes responsibility for any errors or omissions which might be contained in this report.

TABLE OF CONTENTS

Chapter 1	INTRODUCTION	1
	1.1 Scope	1
	1.2 Objectives	1
	1.3 Data Source	2
Chapter 2	SUMMARY AND GENERAL OBSERVATIONS	5
	2.1 Overall Conclusions Drawn from the Study	5
	2.2 Importance of Sea Transport	5
	2.3 Importance of Ports Studied	10
	2.4 Segmentation of Port Activity	11
	2.5 Domestic Markets	12
	2.6 Inland Modes of Transport	13
Chapter 3	METHODOLOGY	17
	3.1 Description of Form B-13	17
	3.2 Selection of Commodities and Countries	18
	3.3 Description and Design of Tables	19
Chapter 4	CANADIAN EXPORTS OF GENERAL CARGO	23
	4.1 General Analysis	23
	4.2 Importance of Ports	25
	4.2.1 According to the Major Groups of General Cargo	25
	4.2.2 According to Final Destination	30
Chapter 5	THROUGH TRANSPORT OF MERCHANDISE AND THE PORT AREAS OF EASTERN CANADA	35
	5.1 The St Lawrence Ports vs. the Atlantic Ports	35
	5.2 Developments in General Cargo Traffic	36
	5.3 The Commercial Organization of a Port	40
	5.4 The Container: More than Just a Cargo Unit	42

5.5 Need for Investment in Facilities and Equipment 44
5.6 Integration of Transport Services: Multimodal Transport 45
5.7 Segmentation of Ocean Shipping Services 47
5.8 Conclusion 48

Chapter 6 MACROANALYSIS OF THE FINAL DESTINATION OF GENERAL CARGO EXPORTED VIA THE PORTS STUDIED 49

6.1 Overview 49
6.2 Final Destination of Trade 51
6.2.1 Western Europe 51
6.2.2 Asia and Oceania 54
6.2.3 South America, Central America and the Caribbean 54
6.2.4 Africa 56
6.2.5 Eastern Europe and the Middle East 57
6.3 Conclusion 60

Chapter 7 COMPARATIVE ANALYSIS OF THE ACTIVITIES OF THE FOUR PORTS STUDIED 63

7.1 Distribution of Canadian Exports by Port 63
7.1.1 Québec 63
7.1.2 Saint John 66
7.1.3 Halifax 68
7.1.4 Montréal 69
7.2 The Western European Market 71
7.2.1 Overview 72
7.2.2 Role of Halifax and Montréal 72
7.3 Analytical Review 76
7.3.1 Market Segmentation 77
7.3.2 Conclusion 82

Chapter 8 INLAND FLOWS OF GENERAL CARGO FOR EXPORT 87

8.1 Description of Hinterland Patterns 87
8.1.1 General Description 87
8.1.2 Major Groups of General Cargo 89
8.2 Analysis of the Hinterlands 93
8.2.1 Calculation of the Index of Categorial Importance and the Flow Trend Index 94

8.2.2 Québec 96
8.2.3 Saint John 98
8.2.4 Halifax 104
8.2.5 Montréal 110
8.3 Overall Analysis 115

Chapter 9 INLAND MODES OF TRANSPORT CONVEYING CARGO TO PORTS 121

9.1 Methodology 121
9.1.1 Sampling Scheme and Target Population 121
9.1.2 Sample Design 122
9.1.3 Value Estimates of the Relative Use of Inland Transport Modes 123
9.1.4 Measures of Reliability of Estimates 125
9.1.5 General Comments on the Estimates 127
9.2 Presentation of Overall Results 128
9.3 Inland Transport Modes by Port 131
9.3.1 Saint John 131
9.3.2 Halifax 132
9.3.3 Montréal 133
9.4 Reasonableness of the Estimates 139
9.4.1 According to the Total Trade Value 139
9.4.2 According to Modal Combinations 141
9.5 Summary 142

BIBLIOGRAPHY 145

APPENDICES 153

A Form B 13 - Canada Customs Export Declaration 155

B List of Bulk Commodities Not Included in the Study 157

C List of Countries and Country Blocs 159

D Main General Cargo Involved in Canada's Overseas Airborne Trade - 1981 161

E Main General Cargo in Canada's Overseas Seaborne Trade Loaded in Pacific Ports - 1981 163

F Shipping Services Offered from Ports Studied - 1981 165

G Schedule of General Cargo 171

H End Products Exported Overseas in 1981 With Reference to Ports Studied 173

I Distribution of Sampled Transactions by Broad Commodity Group and By Local Area of Loading 175

TABLES

4.1 Canadian Exports by Destination and Mode of Transport Out of Canada - 1981 24

4.2 Canadian Overseas Trade by Region of Exit from Canada: General Cargo - 1981 26

4.3 Main General Cargo Involved in Canada's Overseas Seaborne Trade - 1981 29

4.4 Destination of Canadian Seaborne Trade: General Cargo, Overseas Exports - 1981 31

5.1 Volume of General Cargo Traffic in Canada's Main Eastern Ports, 1969-1981 37

6.1 Export Markets for General Cargo Loaded in the Ports Studied - 1981 50

6.2 Distribution of Seaborne Exports by Major Group of General Cargo and Country Bloc of Destination, Overseas Trade - 1981 52

6.3 Export Markets for Main General Cargo Loaded in the Ports Studied - 1981 58

6.4 Export Markets for Main General Cargo (End Products) Loaded in the Ports Studied - 1981 59

6.5 Aggregate Canadian Overseas Exports Passing Through the Ports Studied - 1981 61

7.1 Distribution of Canadian Overseas Exports by Port of Exit - 1981 64

7.2 Distribution of Overseas Exports of General Cargo Excluding Other End Products, by Port of Exit - 1981 65

7.3 Canadian Exports to Western Europe: General Cargo - 1981 73

7.4 Montréal's Share of the Market by Product and Western European Country of Destination - 1981 74

7.5	Halifax's Share of the Market by Product and Western European Country of Destination - 1981	75
8.1	Local Areas of Loading for Overseas Export of General Cargo, by Port Studied - 1981	88
8.2	Ports of Exit for Overseas Export of General Cargo, by Local Area of Loading - 1981	88
8.3	Hinterlands of Ports Studied, by Major Group of General Cargo - 1981	90
8.4	Distribution of Seaborne Exports by Major Group of General Cargo and Local Area of Loading, Overseas Trade - 1981	91
8.5	Port of Québec Main Exports of General Cargo by Local Area of Loading, 1981	97
8.6	Interpretation of Flow Trend Indices (FTI)	100
8.7	Port of Saint John - Main Commodity Flows, 1981	101
8.8	Port of Saint John - Flows of Sundry End Products, 1981	102
8.9	Port of Halifax - Main Commodity Flows, 1981	107
8.10	Port of Halifax - Flows of Sundry End Products, 1981	108
8.11	Port of Montréal - Main Commodity Flows, 1981	113
8.12	Port of Montréal - Flows of Sundry End Products, 1981	114
8.13	Inland Extension of Port Activities: Export of General Cargo - 1981	117
9.1	Classification of Estimates According to their Coefficients of Variation (C.V.)	126
9.2	Estimates of the Proportional Use of Inland Modes of Transport to the Ports of Saint John, Halifax and Montréal, Taken as a Group: Canadian Exports Overseas of General Cargo in 1981	129
9.3	Estimates of the Proportional Use of Inland Modes of Transport to the Port of Saint John: Canadian Overseas Exports of General Cargo - 1981	135

9.4 Estimates of the Proportional Use of Inland Modes of Transport to the Port of Halifax: Canadian Overseas Exports of General Cargo - 1981 136

9.5 Estimates of the Proportional Use of Inland Modes of Transport to the Port of Montréal: Canadian Overseas Exports of General Cargo - 1981 137

9.6 Interport Comparison of Inland Transport Mode Estimates by Major Group of General Cargo: Overseas Canadian Exports - 1981 138

9.7 Comparison of Overall Estimates with Actual Data - 1981 140

9.8 Comparison of the Aggregate Results of This Study with the Results of the 1979 Study on Multimodal Transport: Canadian Overseas Exports 143

FIGURES

2.1 Port of Montréal, Domestic and Foreign Markets, General Cargo in 1981 6

2.2 Port of Halifax, Domestic and Foreign Markets, General Cargo in 1981 7

2.3 Port of Saint John, Domestic and Foreign Markets, General Cargo in 1981 8

2.4 Port of Québec, Domestic and Foreign Markets, General Cargo in 1981 9

2.5 Cumulative Trade Curve in Terms of Distance from Domestic Markets in 1981 14

4.1 Transportation Breakdown of Canadian Foreign Export Trade 27

4.2 Transportation Modes from Canadian Point of Exit of Canadian Overseas Trade in 1981 32

4.3 Port Distribution of Canadian Overseas Port Trade General Cargo, 1981 33

5.1 Relative Share for Ports Under Study: General Cargo 1969-1981 38

5.2	Port Distribution of Containerized General Cargo Traffic, 1969-1981	39
7.1	Port of Saint John - Overseas Destinations and Share of International Markets, 1981	78
7.2	Port of Halifax - Overseas Destinations and Share of International Markets, 1981	79
7.3	Port of Montréal - Overseas Destinations and Share of International Markets, 1981	80
7.4	Port of Québec - Overseas Destinations and Share of International Markets, 1981	81
8.1	Inland Penetration Intensity of the Port of St. John, 1981	99
8.2	Inland Penetration Intensity of the Port of Halifax, 1981	105
8.3	Inland Penetration Intensity of the Port of Montréal, 1981	111
8.4	Percentage Distribution of Trade Loaded at the Ports Under Study in Terms of the Relative Intensity of Ports Orientation in 1981	119
9.1	Eastern Canada's Major Railway Network	130

Chapter 1

INTRODUCTION

The purpose of this study is to analyse port activity in Eastern Canada in relation to Canadian overseas exports of general cargo.

1.1 Scope

The reason for singling out Eastern Canadian seaports is that it is widely recognized that these ports differ from those on the Great Lakes and in Western Canada in organization of shipping, composition of trade and market structures[1].

Only national exports are considered in this report. At the time this study was being prepared, it was not possible to undertake a similar study on imports since there were conceptual constraints on the interpretation of information contained in Canadian import documents.

Moreover, since shipping and port requirements for bulk commodities are usually different from those for general cargo, it was considered expedient to concentrate on general cargo only.

1.2 Objectives

Using data on Canadian overseas exports of general cargo in 1981, this report aims to examine:

- the relative importance of Eastern Canadian ports, in particular the four main ones: Montréal, Québec, Saint John, and Halifax;
- the destinations of the commodities loaded in each of the four ports;
- the kinds of merchandise handled in each of the four ports;
- the inland regions from which the general cargo originates to be exported via the four ports; and
- the proportional use of modes of transport which

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[1] The Canadian Transport Commission has published a study on the shipping services offered by Canadian carriers on the Great Lakes, The Market Potential for Canadian-Registered Vessels Capable of Carrying Great Lakes and Ocean Cargos, CTC, Research Branch, 1981, Report No. 30-81-05.

conveyed general cargo from the point of origin in Canada for export overseas.

1.3 Data Source

The bulk of the data used in this report came from B-13 Customs Export Declaration forms. Information generally found in these documents includes: a description of products, quantities, the unit of measure, the value of the merchandise, the local point of loading, the location of the Customs Office and the countries of destination. The documents also show the mode of transport at the port of exit from Canada and the mode identified at the local point of loading (see Appendix A).

Two factors guided the author's choice of customs export documents as a suitable data base.

First, the study required data with consistency in, and uniformity of, nomenclature and as complete a coverage as possible of seaport activity, both at the national level and at the level of the individual subregions, i.e., the four ports selected for the study. Second, by using the customs documents, it was possible to describe and evaluate general cargo in monetary units, rather than in units of weight.

General cargo covers a great variety of heterogeneous products, from measuring and laboratory equipment, through shipments of fruit and vegetables, to scrap metal exported in containers. Consequently various relations and comparisons between the individual commodities can be established and analyzed more appropriately if the unit of measure is the monetary value of the commodities exported.

The use of bills of lading as the sole data base for the study was also investigated. They did not, however, meet the requirements of an optimal coverage of activities, at least in relation to the four main ports in Eastern Canada, and of consistency in product classification for both containerized and non-containerized goods. Coverage of shipping activity posed major problems. Only the Montréal Port Corporation has a currently operational computerized system of collecting and retranscribing certain information contained on bills of lading. Thus it is practically impossible to carry out a complete and detailed study, involving all the ports, on the basis of bills of lading.

Customs documents offer a distinct advantage in studying total shipping activity. Theoretically, all Canadian overseas trade is covered, and the standard system of commodity

classification meets the objectives of this report. For these reasons, customs export documents were selected as the data base for the study.

As will be seen in Table 5.1, 1981 is a suitable year of reference for the purposes of this report. The effects of the latest economic recession scarcely struck international seaborne trade in general cargo handled in eastern ports in 1981. The effects were shown, rather, in the 1982 statistics[2]. Compared with 1981, the 1982 statistics reveal an 18.2% reduction in total movements of general cargo, while the situation in 1981 was similar to that in 1980.

Finally, from a port's standpoint, it would have been desirable to distinguish within general cargo commodities three main groups: containerized traffic, break-bulk traffic and ro-ro traffic, which usually require specialized facilities or equipment. Unfortunately, no such broad classification were specified in customs documents. Nevertheless, the detailed commodity description used in this study (96 commodity categories and 26 product classes) allowed references to these specialized facilities and equipment. Whenever possible such linkings are presented in the report.

---

2 In 1982 the total volume of general cargo was 8.6 million tonnes, of which 5.6 was containerized and 3.0 non-containerized.

Chapter 2

SUMMARY AND GENERAL OBSERVATIONS

This report deals with port activity on the basis of Canadian overseas seaborne exports of general cargo. The data used for the study are the 1981 statistics on Canadian export trade. The study concentrates on the four main ports of Eastern Canada: Montréal, Halifax, Saint John and Québec. The main objective of the study is to identify and compare the relations between these ports in inland Canadian markets generating the traffic, and in overseas markets served.

The comparative study is undertaken from four different angles: the final destination of the commodities loaded in each port; the composition of the cargo handled; the Canadian regions generating this trade; and, for the ports of Montréal, Halifax and Saint John, the modes of transport used for inland forwarding of the commodities to the port of loading.

This chapter summarizes under six main headings the general findings of the study.

2.1 Overall Conclusions Drawn from the Study

1) The overall conclusion of this report is that, in spite of competition which leads each port to try to attract a maximum amount of traffic, the 1981 statistics show that each port studied is relatively specialized.

2) This relative specialization varies, according to the port and the activity concerned, and relates to products exported, overseas regions served and domestic markets of origin. This triple level of specialization substantiates the first observations on specialization regarding the same four ports, by R.J. McCalla (1979), based on 1976 statistics. This explains why the ports of Montréal, Halifax, Saint John and Québec all continue to play major roles in overseas shipment of Canadian export commodities.

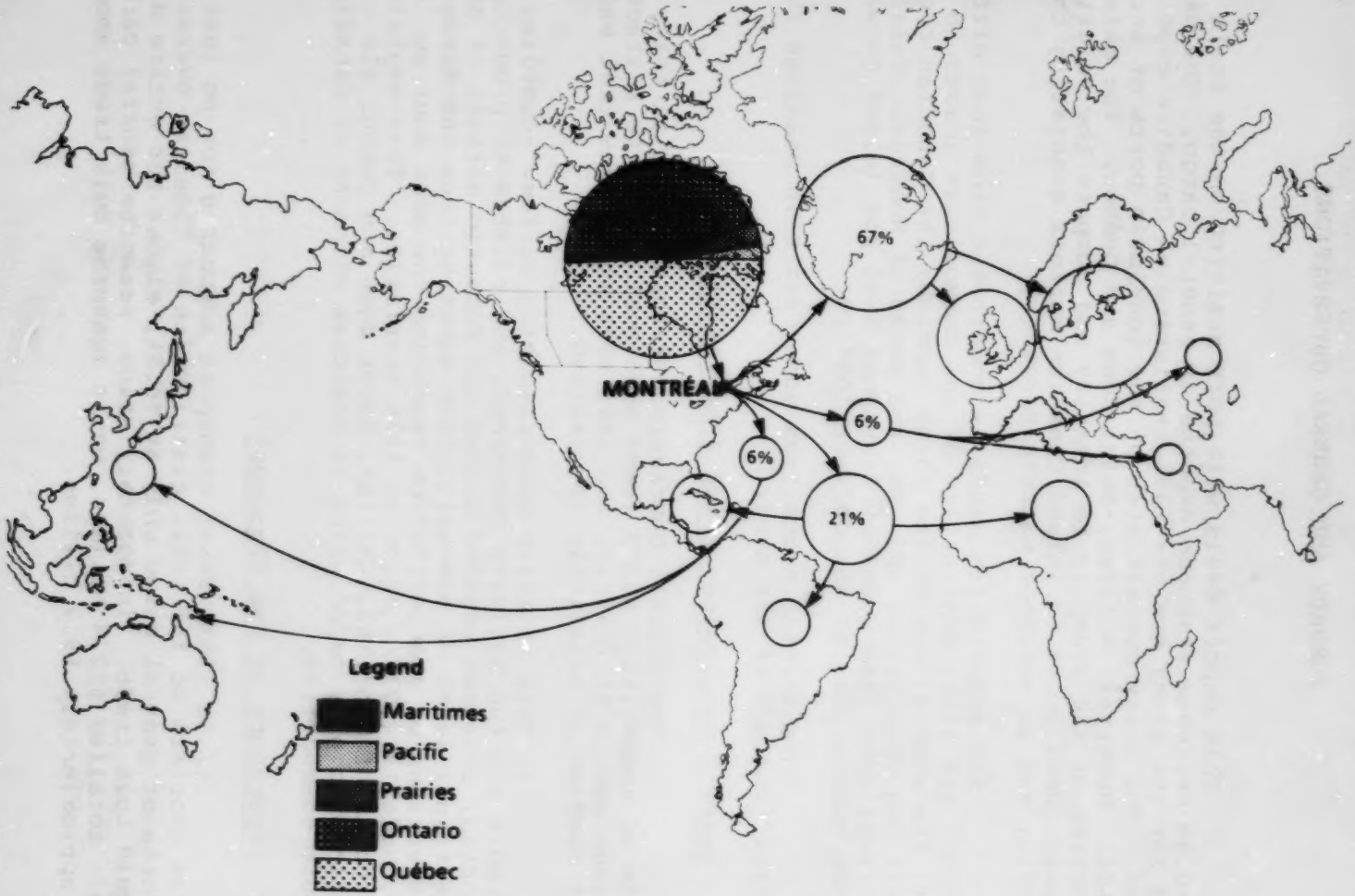
2.2 Importance of Sea Transport

1) In 1981, water transport accounted for no less than three quarters of the total distribution of Canadian overseas exports of general cargo and, at 98.5%, almost the entire dry and liquid bulk trade. In monetary value, seaborne general cargo trade totalled $13.4 billion, while seaborne bulk trade amounted to approximately $9.2 billion.

Figure 2.1

PORT OF MONTRÉAL,

DOMESTIC AND FOREIGN MARKETS, GENERAL CARGO IN 1981

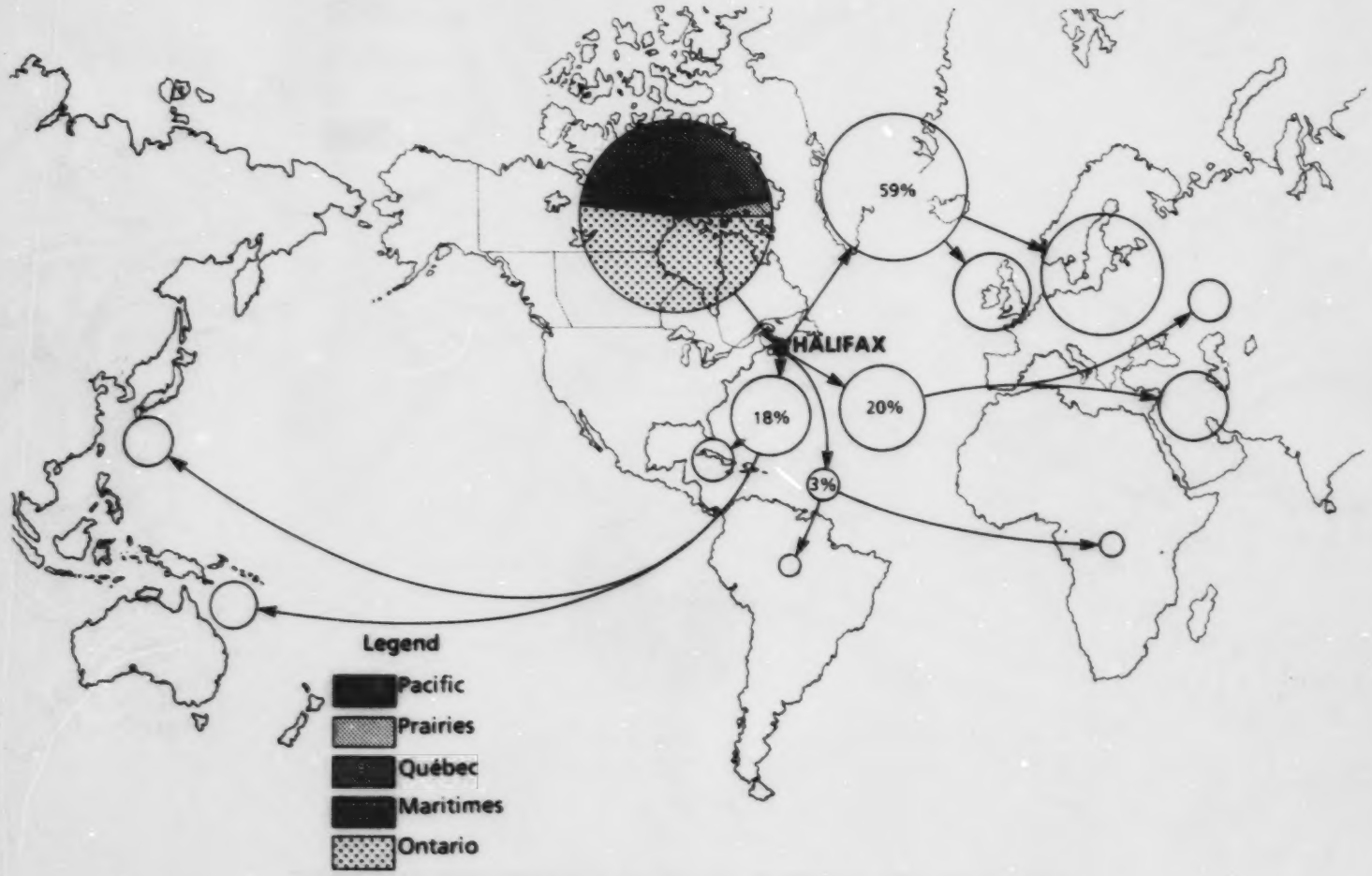


Source: Canadian Transport Commission, Transport Industries Analysis

Figure 2.2

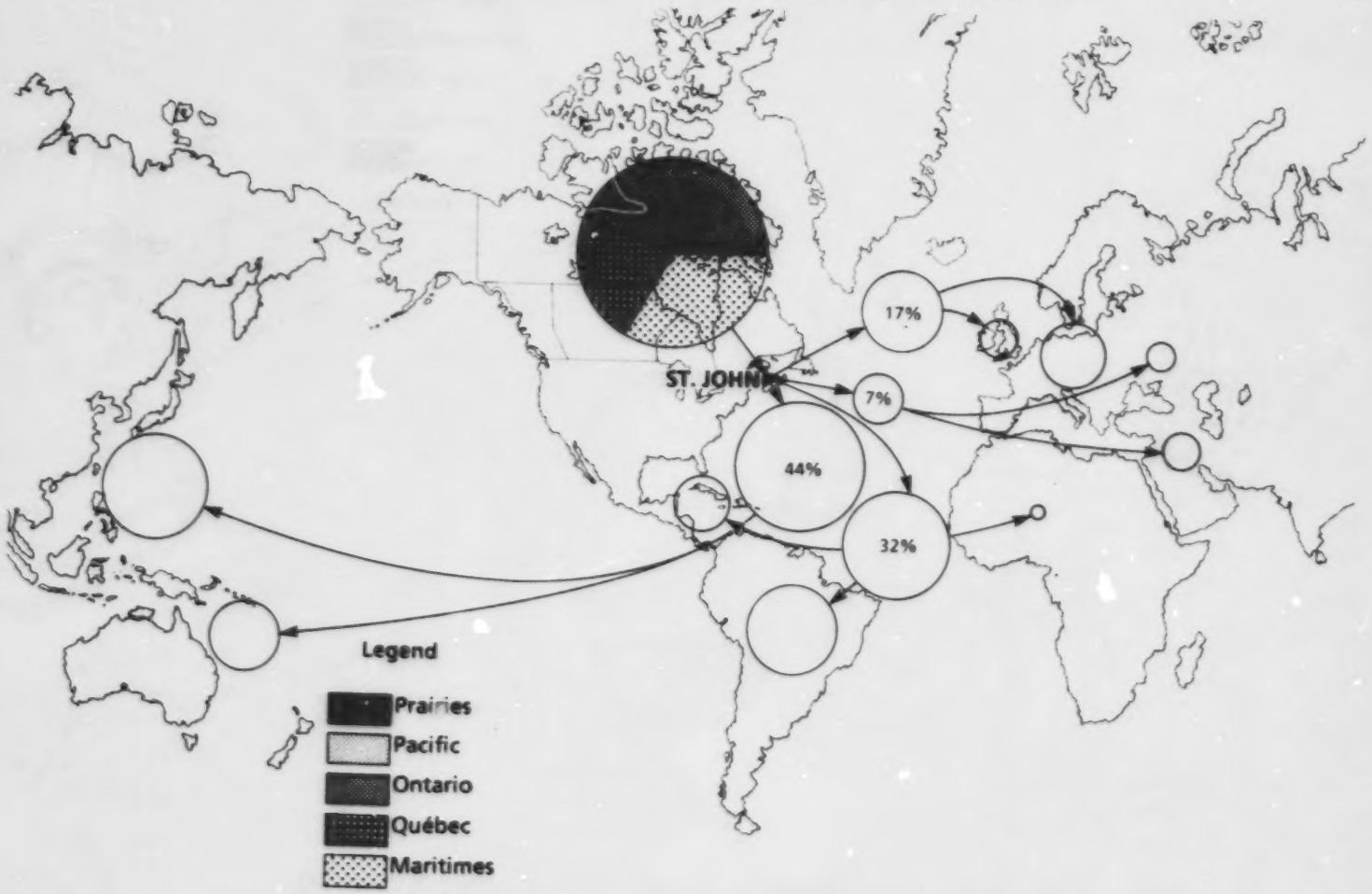
PORT OF HALIFAX,

DOMESTIC AND FOREIGN MARKETS, GENERAL CARGO IN 1981



Source: Canadian Transport Commission, Transport Industries Analysis

Figure 2.3
PORT OF ST. JOHN,
DOMESTIC AND FOREIGN MARKETS, GENERAL CARGO IN 1981

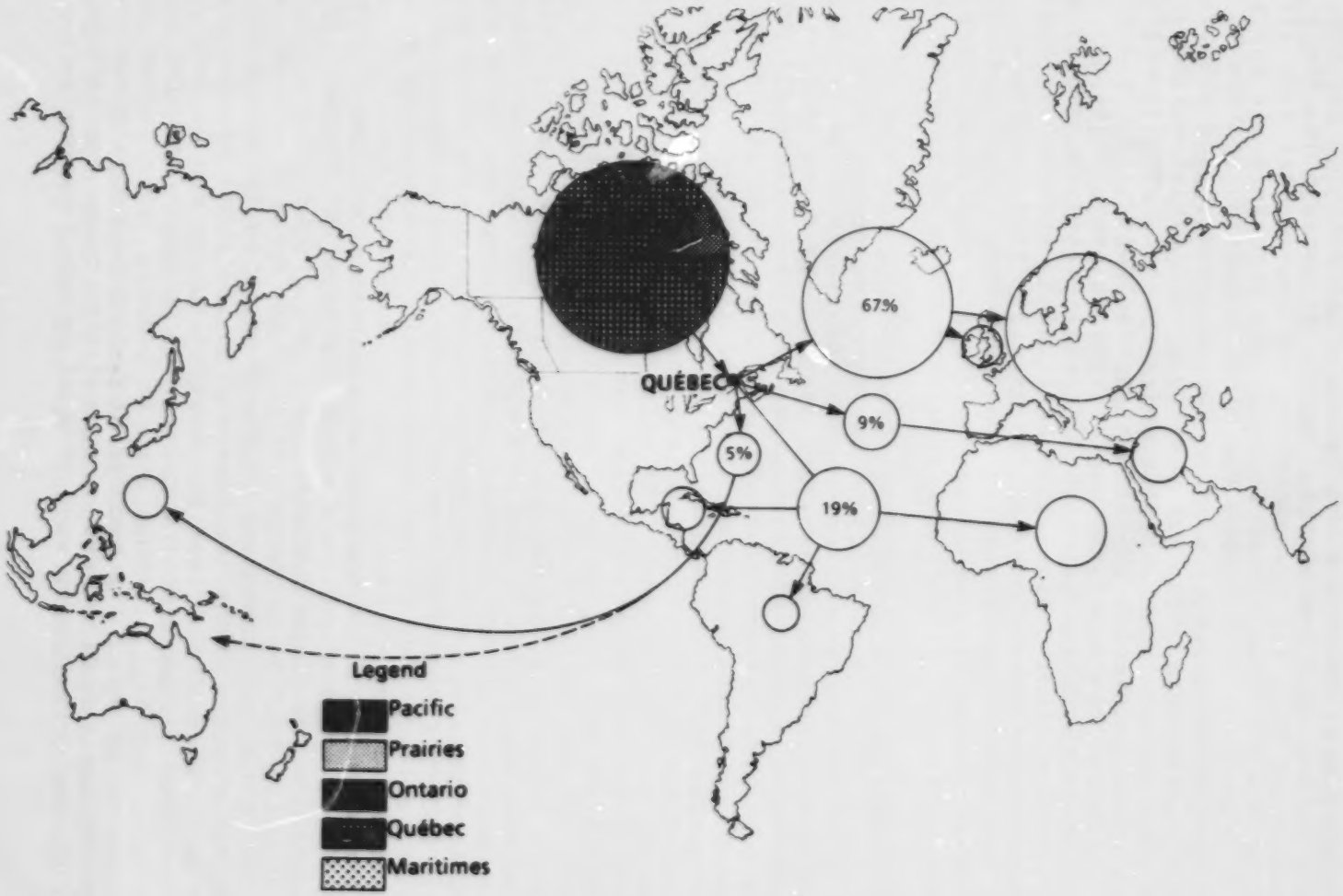


Source: Canadian Transport Commission, Transport Industries Analysis

Figure 2.4

PORT OF QUÉBEC,

DOMESTIC AND FOREIGN MARKETS, GENERAL CARGO IN 1981



Source: Canadian Transport Commission, Transport Industries Analysis

2) Although distribution of Canadian overseas trade is mainly by sea, there are two levels of competition for the distribution of end products. On the domestic side, there is competition from air transport; on the continental side (from the United States) from either water or air transport via American facilities. In 1981, these two other competing sectors of the transportation industry carried 60% of Canadian end products exported overseas (i.e. 40% went by Canadian air services, and 20% went via American seaports and airports). These contrast with other merchandise, where water transport (via Canadian ports) takes shares of the market varying between 76% and 90%. These observations confirm that general cargo, especially end products and those with a high unit value, are susceptible to a quality-price vector of services offered (safety, speed, reliability). The element of transport cost itself has less influence here; its significance varies according to the product transported.

2.3 Importance of Ports Studied

1) In Canada, we can distinguish three major shipping routes for international export trade: the ports of the St Lawrence and the Maritimes, the Great Lakes, and the Pacific coast. These three regions in 1981 dispatched 63%, 3% and 34% of Canada's overseas seaborne exports of general cargo. In 1981, the ports of Saint John, Halifax, Montréal and Québec alone handled almost four-fifths of all trade loaded in the St Lawrence and the Maritime region. In other words, the four ports studied account for 50% of all Canadian overseas seaborne trade in general cargo.

2) In 1981, 86% of Canadian seaborne trade in end products was loaded at one of the four ports studied. This concentration of end products is attributable mainly to the relative proximity of the production areas to the ports and a high degree of containerization of these end products. The relative importance of the ports studied is also evident in relation to Western Canada: 17% of industrial machinery and transportation and communication equipment, and 36% of other end products, originating in the West and exported overseas by sea, were loaded in these ports.

3) The dominance of these ports is further manifested in the overseas countries served. In 1981, 54% of seaborne trade in general cargo destined for Western Europe was dispatched from these four ports; almost a quarter of Canadian seaborne exports to Asia, and half of those sent to Oceania, were loaded in these ports, in spite of the geographical location of the two regions. In addition, at least 60% of commodities bound for each of the other overseas markets were handled by the four ports.

4) The percentages distribution of the value of general cargo exported overseas via the four ports in 1981 is Montréal, 44%; Saint John, 23%; Halifax, 22%; and Québec, 11%.

2.4 Segmentation of Port Activity

1) Comparing the export markets served by each port, and the type of traffic in each, with the shipping services offered at the ports, shows that the kind of activity in each port was much conditioned by changes in the organization of international shipping services. The international system of distributing general cargo that increasingly uses a continuous and integrated door-to-door transport service had a particularly noticeable effect. The 1981 statistics tend strongly to suggest that the relations between the four ports are complementary rather than competitive: each port seems to meet different needs for port services by ocean transport companies.

2) Montréal is the Canadian port for overseas shipping companies offering conventional and containerized shipping services with itineraries that do not usually include American ports. Generally speaking, they supply markets other than those in the Pacific. Another major characteristic of Montréal is the considerable flow of containerized general cargo generated by the United States, mainly the Midwest. However, no attention is given to American container traffic in this study, not because it is considered insignificant but because this report focuses on Canadian demand for port services.

3) Halifax emerges as the Canadian port for carriers offering specialized container services to Canadian and American ports. These continental shipping services are provided mainly on the North Atlantic and the Pacific. In 1981, four-fifths of Halifax's Canadian export traffic came from Canadian regions other than Nova Scotia. Unlike the other ports, Halifax has no specialized activities designed to move a particular type of general cargo, except for containers.

4) Saint John is the base port for most of the services to Pacific markets, i.e. Asia and Oceania. It is also the chief loader of forest products and transportation equipment. This makes Saint John a major port for the handling of fabricated materials and roll on-roll off cargo. In addition, unlike the other three ports, Saint John has few services to Western Europe. Finally, it could be noted that many of the shipping services to South American countries also come out of this port.

5) The port of Québec, despite its provincial role, also plays an important role in certain non-containerized general cargo, notably dairy products, ore concentrates, scrap metal,

wood fabricated materials, lumber and paper. One important factor in liner services offered at this port is that the shipping companies stipulate a minimum load.

6) It becomes apparent from this relative segmentation of markets that competition to attract a maximum flow of traffic to any given port takes place mainly among the shipping companies that operate from different ports according to different market practices and policies. Choice of port seems to be increasingly conditioned by the choice of the system of transport, from the consignor to the consignee, as offered by the various ocean transport companies and international goods transport organizations.

2.5 Domestic Markets

1) Quebec and Ontario contribute equally to the 83% share of Canadian general cargo trade generated in the various provinces to be loaded in the ports studied. The Atlantic and Western provinces account for only 13% and 4% of this trade.

2) Halifax and Saint John take 45% of all Canadian general cargo loaded in the ports studied. It follows that a large proportion of their traffic is generated outside the Maritimes. In 1981, 77% of general cargo loaded in Halifax, and 67% of that handled by Saint John, originated outside the Atlantic provinces. By contrast, 89% of the port of Québec's traffic, and 49% of Canadian trade handled by Montréal, came from the Province of Quebec.

3) Another way to examine port hinterland consists in evaluating the degree of penetration (sphere of influence) of a respective port vis-à-vis a particular region. In contrast to the traditional approach where the emphasis has been placed on the relative importance of each hinterland generating traffic to a given port, this approach allows for a dynamic assessment of the sphere of influence of one port in comparison with others for traffic of a given region. In 1981, most of traffic originating from the Maritime provinces was exported through the ports of Saint John and Halifax, 60% and 39% respectively. Each of these two ports also captured about 10% of traffic generated in the province of Québec and nearly 25% of trade from Ontario and Prairies. For the port of Montréal, its penetration is much more pronounced vis-à-vis all regions in Canada (capturing nearly 50% or more of the total trade), with the exception of the Maritime provinces. In short, it appears that the spheres of influence of the ports of Saint John, Halifax and Montréal overlap in respect of the Ontario and Prairie markets and, to a lesser extent, vis-à-vis the province of Québec.

4) A detailed study of traffic flows, by type of commodities, their region of origin and their ports of exit, permits a further analysis of the level of penetration of each port. The 1981 data reveal that both Halifax and Montréal are highly diversified but Halifax, of the four ports examined vis-à-vis their hinterland markets, is the one showing lesser dependence expressed on a commodity flow basis.

5) Based on the 1981 data, it can be argued that a significant portion of the total trade exported through the four ports under study correspond to specific commodity flows, originating primarily from a specific region and being highly oriented towards a specific port. Indeed nearly 50% of the total value of export trade through the four ports in 1981 can be associated with this type of traffic. It would thus appear that each port has a relatively specialized share of influence when traffic flows through these four ports are examined product by product taking in account its region of origin.

2.6 Inland Modes of Transport

1) In 1981, the trucking sector accounted for 83% by value of inland transport of Canadian general cargo loaded in Montréal, Halifax and Saint John for export overseas. Rail accounted for only 16% of such transport. The share, albeit indirect, of inland shipping and air transport was barely 1%.

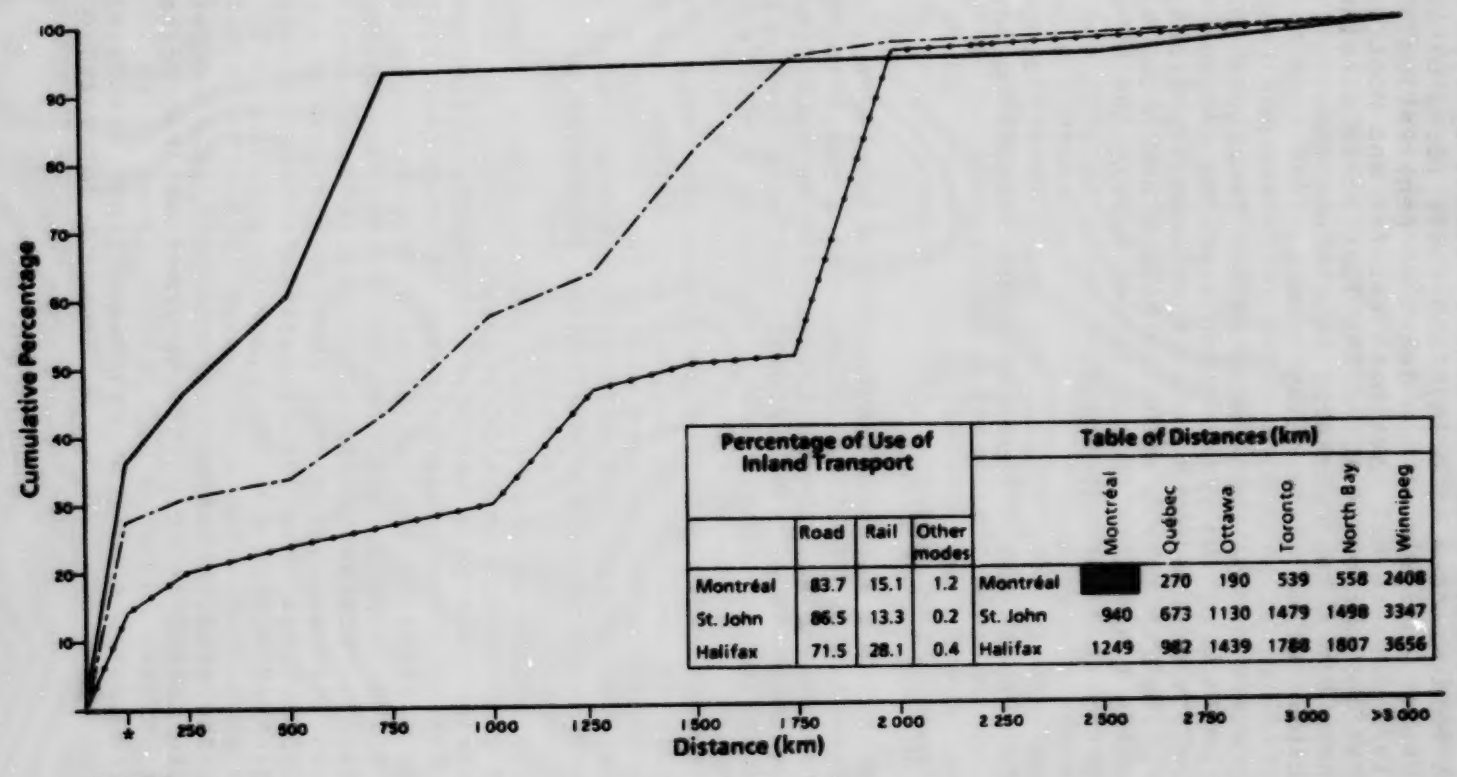
2) These overall estimates do not, however, give a precise picture of competition between rail service and trucking. Rail/road competition can be more easily seen through a market analysis, where each port is considered on the basis of the type of commodities transported and the inland region of origin.

3) The 1981 data bring out the relationship between distance and the various modes of transport. Rail accounted for about 70% of all trade originating in the West, while trucking represented 75% to 90% of inland transport of commodities coming from the East. Figure 2.5 also indicates the relative proximity of Montréal's and Saint John's domestic markets, compared with those of Halifax. Whereas Montréal and Saint John generated over 90% and almost 60% respectively of their traffic from a radius of 1 000 kilometres, less than 30% of Halifax's total exports traffic originated within a 1 000 kilometres radius.

4) The study revealed that the rail/road competition is generally more marked in shipments of foods and fabricated materials.

Figure 2.5

CUMULATIVE TRADE CURVE IN TERMS OF DISTANCE FROM DOMESTIC MARKETS IN 1981



Percentage of Use of Inland Transport	Road	Rail	Other modes
Montréal	83.7	15.1	1.2
St. John	86.5	13.3	0.2
Halifax	71.5	28.1	0.4

Table of Distances (km)	Montréal	Québec	Ottawa	Toronto	North Bay	Winnipeg
Montréal		270	190	539	558	2408
St. John	940	673	1130	1479	1498	3347
Halifax	1249	982	1439	1788	1807	3656

Legend

———Montréal

-·—·-St. John

-·-·-Halifax

* Metropolitan area (100 km)

Source: Canadian Transport Commission, Transport Industries Analysis

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Chapter 3

METHODOLOGY

Because of the detailed statistics required for this study, special tables had to be prepared by the External Trade Division of Statistics Canada. They are based on the same computer files used for the official publication Exports: Merchandise Trade[1]. The files consisted of information gathered from B-13 forms.

3.1 Description of Form B-13

One of the peculiarities of Form B-13, completed by the exporter or his official representative, is that this declaration of goods and merchandise exported must be filed at the Customs Office where the merchandise leaves Canada. Thus, by limiting ourselves to exports which left Canada by water, we can obtain the composition and description of merchandise handled by the ports of Montréal, Halifax, Saint John and Québec from the B-13 forms filed with the Customs Offices for the four ports. Each city has its own Customs Office.

The results of a pilot project on international water transport statistics conducted in 1975 by the Transportation and Communication Division of Statistics Canada, in cooperation with Revenue Canada, Customs and Excise, provide support for linking together "seaport of exit" and "Customs Office"[2].

More specifically, the project established that 91% of the manifests of ships registered in Vancouver[3] could be linked to the B-13 export documents filed with the Vancouver Customs Office[4].

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[1] Statistics Canada, External Trade Division, Cat. No. 65-202 (annual).

[2] Statistics Canada, Transportation and Communication Division, Pilot Project Report on International Water Transport Statistics, June 1976.

[3] Most of the documents that could not be linked concerned noncommercial transactions. See Statistics Canada, op. cit., Chapter 3, pp 17-18 and Appendix C, pp 51-52.

[4] The Ship Manifest (Form A6) is prepared by the shipping company representative for any ship arriving at a Canadian port from a

The correspondence between B-13 forms and ship manifests supports the present study in using customs export data to describe the port activity and composition of trade of the four ports studied. A similar approach could not be taken for import trade when this report was being prepared. For this reason analysis of seaborne imports of general cargo could not be included in this study.[5]

3.2 Selection of Commodities and Countries

To help prepare the basic data for this report, the study group had to provide the External Trade Division with:

- the list of commodities to be considered and
- the names of appropriate countries and country blocs.

Since the report was to concentrate on Canadian exports of general cargo, a first task was to draw up the list of commodities to be considered. To this end we relied on previous research on the establishment of various product categories [6].

By defining general cargo as 1) products that are usually placed in bags, bales, boxes or bundles or on pallets and 2) products that are usually containerized, we were able, by a process of elimination, to offer Statistics Canada a list of bulk products to be excluded from the study[7].

Footnote Continued
foreign port and any ship leaving a Canadian port for a foreign port. A copy of this manifest must be filed with the Customs Office for the port region where the ship has arrived or from which it has departed.

[5] The degree of correspondence between Forms A6 and B-3 (for import shipments) has been set at only 47%. This means that 53% of trade commodities unloaded at Vancouver cannot be identified on the basis of the customs import documents filed with the Customs Office of that port region.

[6] CTC, Research Branch. Unit Values of Commodities Moving in Canadian Overseas Trade, Report No. 20-78-01E.

[7] This list of bulk products is based on the Statistics Canada five-digit export commodity classification. Appendix B gives the complete list of bulk commodities excluded for the purposes of this report.

The list of countries and country blocs was based on geographical regions defined by the External Trade Division[8], Statistics Canada, and on two recent studies on container traffic through the ports of Halifax, Saint John and Montréal[9].

To begin with, the relative importance of all countries importing Canadian goods in 1979 and 1980 was calculated using statistics published by Statistics Canada. Subsequently, from the list of main countries of final destination for container traffic which the two studies of the Canadian Maritime Transportation Centre enabled us to identify, we ensured that these countries would be considered.

For budgetary reasons it was not possible for us to consider all Canada's trading partners. Eight major export regions were defined to include all Canadian export markets, and the 20 most important countries were identified. Appendix C lists the countries selected and gives the eight major export regions. As indicated earlier, the study does not include Canadian exports to the United States, since the focus is on overseas exports.

3.3 Description and Design of Tables

With these various restrictions in mind, we requested three special tables from the External Trade Division, Statistics Canada. The first describes merchandise handled in each of the four ports studied, divided into five "local points of loading" for the various types of merchandise.

The description of the commodities follows the Statistics Canada two-digit export commodity classification (X.C.C.) system. The system has 96 commodity categories. The five local areas of loading are the Atlantic provinces, Quebec, Ontario, the Prairie provinces and the Pacific region.

It should be noted that the local point of loading does not necessarily correspond to the "area of first origin" of the

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[8] Statistics Canada, External Trade Division. Exports: Merchandise Trade, Cat. No. 65-202 (annual).

[9] Canadian Maritime Transportation Centre (CMTC). A Comparison and Analysis of 1978 Export-Import Container Traffic Through the Ports of Halifax and Montréal (1980) and The Ports of Halifax, Montréal, Saint John: A Comparison of Export Trade (1979), Dalhousie University.

export commodities. The explanatory notes to Exports: Merchandise Trade, referred to earlier, state that a local point of loading is defined as one of various points in Canadian territory--a mine, a farm or a factory--where the commodities are loaded and entrusted to a carrier for export. Although in the case of non-containerized products the local point of loading may coincide fairly closely with the true origin, it is not so with containerized goods. The local point of loading for most containerized commodities may correspond to a marshalling point. From the information currently available it is not possible, however, to differentiate between cases where the local point of loading is a farm, factory or mine and cases where it is a marshalling point.

It would therefore seem preferable not to assimilate, directly and for all commodities, the notion of "local point of loading" with that of "area of first origin" when referring to commodities loaded at the various ports studied. In this report the term "origin" refers solely to "local point of loading" in the limited sense just mentioned. The term "area of first origin" should be used only in cases where there is no doubt.

The second table again describes the products handled in each port, but this time they are broken down by final destination of the products according to the list of countries and country blocs referred to earlier.

The third table shows all Canadian overseas export commodities in terms of a) mode of transport out of Canada and b) the five Canadian regions of exit. The same five regions used for the local areas of loading are utilized for the purposes of this third table. The four principal modes of transport are identified, viz. water, air, rail and road[10].

A final point on methodology concerns the estimated proportions of the various modes of transport used to convey general cargo to the ports studied for seaborne export overseas. Unlike the other data, those relating to inland modes of transport have not been collected systematically by Statistics Canada. This means that information on inland modes of transport has to be obtained from individual original export declarations (Form B-13). For the purposes of our study, a sampling procedure had to be designed to collect this information. This procedure is presented in detail in the first part of Chapter 9. As the

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[10] As shown in Chapter 4, the other means of transport--pipeline and postal packages--are used chiefly for exchanges between Canada and the United States.

results of the samples do not relate to the other chapters, we considered it preferable to describe the sampling procedure in the relevant chapter.

Chapter 4

CANADIAN EXPORTS OF GENERAL CARGO

The aim of this chapter is twofold: first, to bring out the relative importance of the various transport modes of overseas export from Canada, and second, to indicate the general role of the four main ports of Eastern Canada.

4.1 General Analysis

The total value of Canadian overseas exports in 1981 was close to $27.4 billion. General cargo as defined earlier amounts to two-thirds of the value of these exports. Bulk commodities and special commercial transactions account for the other third.

Because of Canada's geographical location, overseas commercial exchanges generally have to be carried out by sea and air. However, a study of the statistics on the mode of transport used at the point of exit from Canada shows that a proportion of this trade leaves the country by land (see Table 4.1). In fact, approximately 10% of the total value of commodities destined for overseas countries was carried via road or rail. These goods, after leaving Canada by land, are either conveyed to an American seaport or airport, or transited across the United States before reaching their final destination. It seems reasonable to assume that transit is used mostly for exports to Mexico.

Distinguishing between merchandise transported in bulk and general commodities reveals the type of goods that do not pass through Canadian seaports or airports. This points up the phenomenon known as diversion of a country's trade via the seaports or airports of another country[1]. In Canada the proportion of overseas exports of bulk commodities diverted to

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[1] On the information currently available, it is not possible to differentiate between exports to Mexico transiting the United States and overseas exports moving through an American seaport or airport. In this study all exports to Mexico--for which the mode of transport out of Canada is either rail or road--are therefore regarded as Canadian traffic transiting the United States. Although this approach leads to an underestimation of the traffic leaving Canadian ports, the authors of this study consider it preferable to a possible overestimation.

Table 4.1

CANADIAN EXPORTS BY DESTINATION AND MODE OF TRANSPORT OUT OF CANADA, 1981

National Exports	Value ($ million)	Percentage	Mode of Transport Out of Canada				
			Water %	Road %	Rail %	Air %	Other %
Total value	81 203.3	100.00	31.8	32.5	18.8	5.8	11.1
USA	53 816.0	66.27	6.0	45.0	27.4	4.8	16.7*
Overseas	27 387.3	33.73 (100%)	82.4	8.0	1.7	7.8	N/A
General commodities exported to countries overseas:							
including Mexico	18 077.5	22.26 (66%)	74.2	11.9	2.4	11.5	N/A
excluding Mexico	17 426.4		76.1	11.0	1.2	11.7	N/A
Bulk commodities and special commercial transactions not included in study	9 309.8	11.46 (34%)	98.5	0.6	0.4	0.5	N/A

Note: N/A indicates insignificant value.

* 99.9% of exports by other modes of transport (pipeline, courier and parcel post) entered the United States from Canada in this way.

Source: Statistics Canada, External Trade Division.

American ports is, at barely 1%, minimal. By contrast, in 1981, 12.2% of overseas exports of general cargo to countries other than Mexico were diverted[2].

It will also be noted that competition between sea and air prevails in the general cargo market, while the sea is used almost exclusively for overseas transport of bulk merchandise[3].

4.2 Importance of Ports

Table 4.2 and Figure 4.1 show the distribution of overseas seaborne exports of general cargo according to the three major regions of exit from Canada. The significance of the ports on the Atlantic seabord, particularly the four ports studied, is obvious.

In 1981, the ports of Quebec and the Atlantic provinces together handled 63% of seaborne exports of general cargo, 79% of which were loaded in the four ports studied. In other words, half by value of all Canadian seaborne exports passed through the four ports. The Pacific ports, including the port of Vancouver, loaded a third of Canada's seaborne exports. The value of overseas exports through the Great Lakes, from the Ontario region, totalled some $500 million, or just over 3%.

4.2.1. According to the Major Groups of General Cargo

The statistics on the major commodity groups suggest four general observations on Canadian sea transport.

First, 86% of all end products shipped through Canadian ports are loaded in the four ports studied. These comprise industrial and agricultural machinery, transportation and communication equipment, and industrial and consumer goods.

Second, the fabricated materials group of commodities (mainly wood products and pulp, nonferrous metals, chemical and related products, iron and steel products, and textile fabricated materials) represents over half of Canada's seaborne exports. Approximately $4 billion worth of these commodities are dispatched via the ports of Quebec and the Maritimes. Montréal,

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[2] The rate of diversion is actually 10% if we exclude motor vehicles and parts, which represent a specific overseas transport market.

[3] Appendix D lists general cargo exported overseas by air.

Table 4.2

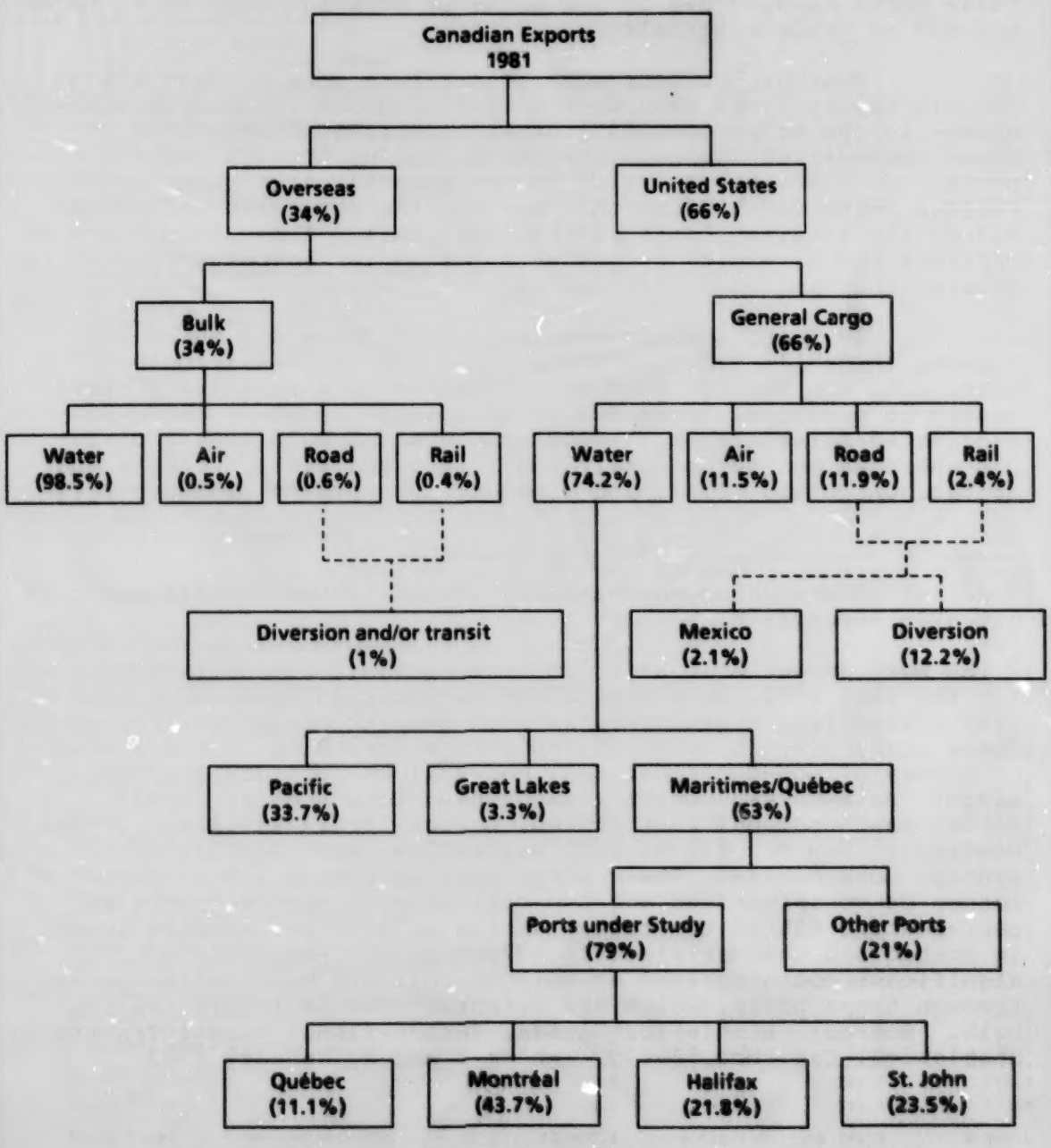
CANADIAN OVERSEAS TRADE
BY REGION OF EXIT FROM CANADA

General Cargo - 1981
($ millions)

Major Commodity Group	Total Overseas Trade	National Seaborne Trade	Pacific Region	Ontario (Great Lakes)	Quebec and Maritimes	Four Ports Studied: Value	Four Ports Studied: Portion of Seaborne Trade (%)
Live animals	49.0	0.0963	0.048	0.0	0.0483	0.048	49.8
Foods, feed, beverages and tobacco	2 201.7	1 689.4	464.5	106.6	1 118.3	862.7	57.0
Crude materials, inedible	2 803.9	2 442.9	905.9	37.1	1 499.9	1 187.5	48.6
Fabricated materials, inedible	7 961.3	7 176.0	2 999.2	225.7	3 951.1	2 711.2	37.8
End products, inedible:							
a) Industrial and agricultural machinery, and transportation equipment	3 366.8	1 478.5	112.4	69.1	1 297.0	1 234.7	83.5
b) Other end products	1 694.8	620.0	32.2	8.3	578.4	572.8	92.4
Subtotal	5 061.6	2 098.5	144.6	78.4	1 875.4	1 807.5	86.1
Total	18 077.5	13 406.9	4 514.3	447.8	8 444.7	6 668.9	49.7
Percentage		100.0	33.7	3.3	63.0		

Source: Statistics Canada, External Trade Division.

Figure 4.1
TRANSPORTATION BREAKDOWN OF CANADIAN FOREIGN EXPORT TRADE



Note: Original data expressed in terms of value.
Source: Canadian Transport Commission. Transport Industries Analysis.

Québec, Halifax and Saint John alone handle 38% of all Canadian seaborne exports of fabricated materials.

The third observation concerns the importance of the four ports in relation to the foods and crude materials groups. These ports handled 57% of the value of seaborne exports of foods and 47% of crude materials.

Fourth, the four ports contribute more to Canada's overall export trade than do the Pacific ports (mainly Vancouver) except in one major commodity group: fabricated materials. These commodities dominate the trade passing through Pacific ports. In 1981, 66% by value of the general cargo[4] traffic of Pacific ports depended on this sector; the ports studied showed 41% of the activity in fabricated materials. These seem to indicate the diversity of products loaded in the ports studied is greater than in the Pacific ports.

In fact, a close examination of Table 4.3 shows that exports loaded in Canadian ports other than Montréal, Québec, Saint John and Halifax tend to be limited to a relatively small number of products. Over 80% of this trade involves crude and fabricated materials, i.e. wood products and pulp (50%); ore concentrates and scrap metal (15%); iron and steel products and nonferrous metals (11%); and chemical and related products (6%)[5].

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[4] A list of the main general cargo loaded in the Pacific ports is given in Appendix E.

[5] The most recent statistics on international ocean traffic, i.e. for the year 1979, show that eight seaports in Eastern Canada play a significant secondary role in general cargo sea transport. These ports are, in order of importance according to the number of tonnes of non-containerized, non-roll on-roll off general cargo: Baie Comeau, Quebec; Dalhousie, Nova Scotia; Corner Brook, Newfoundland; Port Alfred, Quebec; Trois-Rivières, Quebec; Newcastle, New Brunswick; Port Hawkesbury, Nova Scotia; and Sydney, Nova Scotia. These ports handled around 4.9 million tonnes of containerized and non-roll on-roll off commodities, representing 65% of the total tonnage of such merchandise loaded in Quebec and the Maritimes in 1979. In the same year no significant containerized or roll on-roll off merchandise passed through these ports, which are oriented towards liquid and dry bulk. Source: Statistics Canada, International Vessel Traffic Statistics, Cat. No. 54-209, Tables 1 and 2, January 1982.

Table 4.3

MAIN GENERAL CARGO INVOLVED IN
CANADA'S OVERSEAS SEABORNE TRADE
1981
($ millions)

Major Groups and Commodity Categories	Total Value	Area of Exit: Pacific	Quebec and Maritimes	Four Ports Studied**
Foods, feed, beverages and tobacco				
(03)* Fish and marine animals	628.3	262.9	365.0	237.9
(06) Grain, flour, semolina and cereal preparations	296.4	86.7	196.6	196.6
(09) Vegetables and vegetable preparations	167.1	19.2	124.5	107.1
(15) Fodder and feed (except unmilled cereals)	125.3	33.0	25.0	22.8
(05) Dairy products, eggs and honey	102.6	1.0	101.1	93.4
(18) Tobacco	97.1	0.1	96.7	96.1
Total	1 416.8	402.9	908.9	753.9
Group Total	1 689.4	464.5	1 118.3	962.7
Crude materials, inedible				
(25) Ore concentrates and scrap	1 742.5	760.9	977.3	739.8
(27) Crude nonmetallic minerals	438.6	63.9	374.4	318.0
(21) Crude vegetable products, inedible	92.3	12.5	47.6	36.5
(20) Crude animal products, inedible	73.5	16.9	56.6	53.4
(23) Crude wood materials	41.8	37.6	4.2	2.2
Total	2 388.7	891.8	1 460.1	1 149.9
Group Total	2 442.9	905.9	1 499.9	1 187.5
Fabricated materials, inedible				
(34) Pulp	1 796.9	1 316.9	460.5	318.8
(35) Paper and paperboard	1 293.6	291.0	997.9	257.7
(45) Nonferrous metals	1 250.4	449.5	800.6	764.4
(40) Chemical and related products	1 179.4	170.0	873.0	802.3
(33) Wood fabricated materials	1 027.1	757.0	266.3	191.2
(44) Iron and steel products	306.0	2.7	247.0	78.9
(36) Textile fabricated materials	136.3	1.1	135.0	133.9
Total	6 989.7	2 988.2	3 780.3	2 547.2
Group Total	7 176.0	2 999.2	3 951.1	2 711.2
Industrial and agricultural machinery, and transportation and communication equipment				
(58) Road motor vehicles	616.3	3.8	581.3	579.6
(52) Special industry machinery	340.1	66.9	362.8	257.9
(50) General purpose industrial machinery	147.0	5.1	127.3	126.5
(57) Railway rolling stock	91.6	0.4	91.2	80.2
(63) Communication and related equipment	83.3	0.8	81.0	80.3
(59) Ships and boats	52.7	2.7	47.9	39.8
(51) Conveying, elevating and material handling equipment	49.8	4.9	42.7	39.8
Total	1 380.8	84.6	1 235.2	1 174.4
Group Total	1 478.5	112.4	1 297.0	1 234.7
Other end products				
(94) Miscellaneous end products	108.7	10.8	93.3	90.8
(68) Electric lighting, distribution and control equipment	62.6	1.3	59.8	58.1
(70) Measuring, controlling, laboratory, medical and optical instruments, apparatus and accessories	41.3	2.1	38.8	38.2
(83) Recreation equipment, toys, games, sporting and athletic goods	41.3	1.1	40.1	40.1
(84) House Furniture	34.0	0.5	33.5	33.5
(93) Firearms, weapons and ammunition	30.7	0.2	30.5	30.5
Total	318.6	16.0	296.0	291.2
Group Total	620.0	32.3	578.4	572.8
Grand Total	13 406.9	4 514.3	8 444.7	6 668.9

* The two-digit Canadian export commodity classification number (XCC) is given in brackets.
** Statistics included in "Quebec and Maritimes".

Source: Statistics Canada, External Trade Division.

4.2.2 According to Final Destination

The four ports can also be examined for their share of the total value of seaborne exports by country bloc of destination. This is in Table 4.4.

The Western European countries represent the chief overseas market of these ports. In 1981 these countries, to which service by the ports studied represented 54% of total Canadian service, received over 53% of all Canadian exports handled by the ports. Asia was far behind, accounting for only 11.5% of the general cargo traffic of the four ports. The major role played by the four is illustrated by the fact that, apart from Western Europe, only two country blocs, viz. Asia and Oceania, are not served by them by at least 60%.

The figures for Asia and Oceania may actually be seen as both high and low. They are low because they are below 50%; they are high that the geographical location of the countries would favour Pacific coast ports.

To sum up, we find that among the modes of transport out of Canada (except to American and Mexican destinations), water transport is used most. This is illustrated in Figure 4.2. We also note the phenomenon of diversion of Canadian trade via American ports. In seaborne trade, Saint John, Halifax, Montréal and Québec are the dominant ports, not only for the Quebec and Atlantic regions, but for the country (Figure 4.3).

Except for exports to the Asian bloc--and to a lesser extent Oceania, served mainly by the Pacific coast ports--Saint John, Halifax, Montréal and Québec emerge clearly as the dominant ports of exit for Canadian exports of general cargo other than fabricated materials; for the most part other Canadian ports handle these.

Table 4.4

DESTINATION OF CANADIAN SEABORNE TRADE:
GENERAL CARGO

Overseas Exports
1981
($ million)

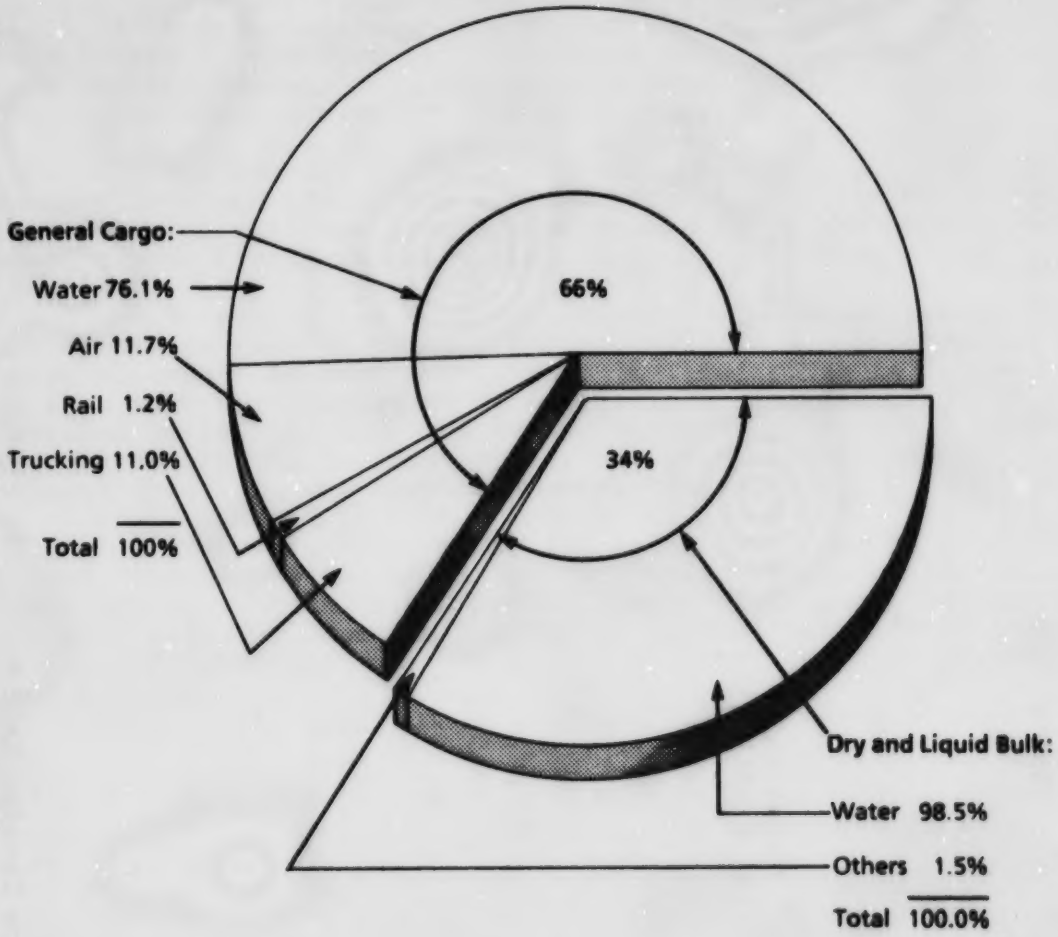
Country Bloc of Destination	Total Value of Exports(1)	Percentage of Exports	Four Ports Studied: Trade Value(2)		Four Ports Studied: Value as % of Total Exports(1)
Western Europe	6 546.9	48.9	3 555.7	(53.3)	54.3
Eastern Europe	300.1	2.2	203.5	(3.0)	67.8
Middle East	538.1	4.0	422.9	(6.3)	78.6
Africa	559.8	4.2	360.8	(5.4)	64.4
Asia	3 184.0	23.8	766.8	(11.5)	24.1
Oceania	596.2	4.4	296.8	(4.4)	49.8
South America	973.2	7.3	584.7	(8.8)	60.1
Central America & Caribbean	701.9	5.2	477.6	(7.2)	68.0
Total Value	13 406.9	100.0	6 668.9	(100.0)	

Source: Statistics Canada, External Trade Division.

Figure 4.2

TRANSPORTATION MODES FROM CANADIAN POINT OF EXIT OF CANADIAN OVERSEAS TRADE IN 1981

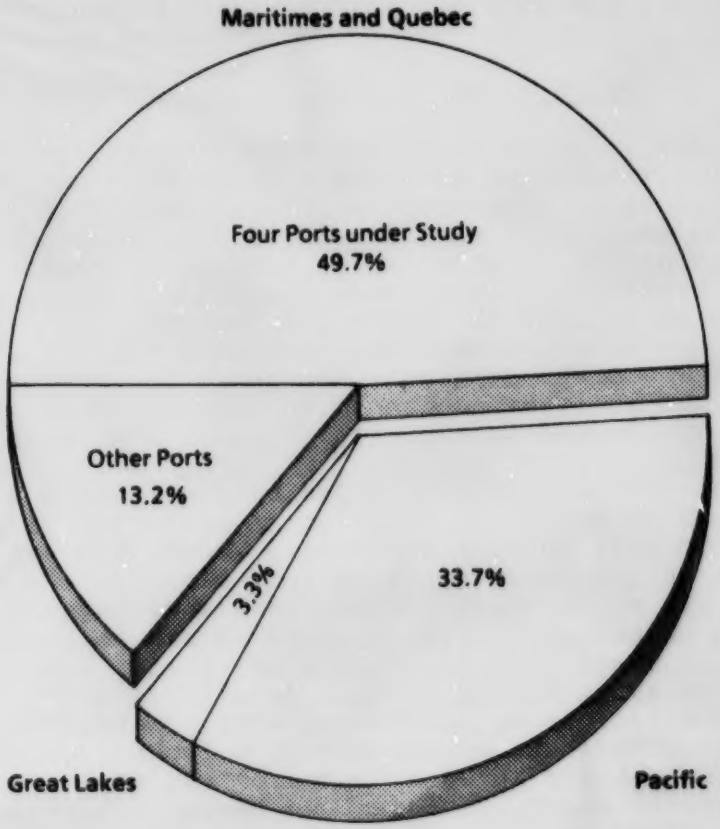
(United States and Mexico excluded)



Note: Original data expressed in terms of value

Source: Canadian Transport Commission, Transport Industries Analysis

Figure 4.3
PORT DISTRIBUTION OF CANADIAN OVERSEAS EXPORT TRADE
GENERAL CARGO, 1981



Note: Original data expressed in terms of value.

Source: Canadian Transport Commission, Transport Industries Analysis.

Chapter 5

THROUGH TRANSPORT OF MERCHANDISE AND THE PORT AREAS OF EASTERN CANADA

The aim of this chapter is to show the impact of containerization on the organization and development of ocean shipping services by examining general cargo market shares of the main ports in Eastern Canada between 1969 and 1981. This provides a perspective for the data for 1981 and facilitates study of the subsequent chapters.

5.1 The St Lawrence Ports vs. the Atlantic Ports

During the last 15 years ocean shipping has changed substantially, both nationally and internationally, a result of technological developments. Water transport in particular has been affected by the introduction of new techniques of handling, loading and unloading cargo, and new ways of designing and constructing ships. All these were largely initiated or influenced by containerization, which, as will be seen in later sub-sections, favours uniformity in loading units and standard handling equipment all along the transport chain. This can only promote better articulation of transport services by the various modes, resulting in a through transport system of merchandise.

These developments had a particularly strong effect on the organization of ocean shipping in the ports of Eastern Canada. In the mid-1960s, before the introduction of containers, the ports in the Atlantic provinces, particularly Halifax and Saint John, emerged as winter ports. These ports came to complement those on the St Lawrence River, including Montréal, which were closed during the winter season. Grace C. Powell's study (1968) on international traffic in the ports of Saint John and Halifax in 1957 and 1964 provides a good picture of this period[1]. The introduction of containers and the development of through transport helped to reduce most of the geographical and physical constraints caused by distance. These constraints greatly limited the hinterlands of the various ports, making them submarkets, more or less closed or, at least well delimited geographically. A new relationship was thus formed between the ports of the St. Lawrence and those of the Maritimes.

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[1] The years 1957 and 1964 were chosen partly for comparison of statistics before and after the opening of the St. Lawrence Seaway.

Over the past decade, however, a new competitive relationship has to some degree replaced the complementary one. The ports of Saint John and Halifax have become major ports for year-round ocean shipping services for general cargo, as has Montréal since 1962[2], the first year the St Lawrence was kept open throughout the year.

Table 5.1 shows the changing role of Atlantic ports in ocean transportation of general cargo passing through the major ports in Eastern Canada between 1969 and 1981.

5.2 Developments in General Cargo Traffic

On the basis of the historical data three general observations can be made regarding changes in ocean shipping through the ports. First, a comparison of the increased container traffic passing through the main ports in Eastern Canada with the increased general cargo traffic passing through Halifax and Saint John, between 1969 and 1978, reveals that a reorganization of shipping services in Eastern Canada coincided with the development of containers; and that this particularly favours Halifax and Saint John (Figure 5.1).

Second, the statistics of three consecutive years, 1979 to 1981, seem to indicate a) that containerization reached a certain plateau at 57% of the total volume of general cargo (Figure 5.1); and b) that the period 1977 to 1980 saw relative stabilization of the shares of containerized traffic coming to Halifax, Saint John and Montréal, while in 1981 Montréal's share of the traffic returned to about same level as 1976 (Figure 5.2).

Third, an examination of the tonnage of non-containerized cargo handled by each port reveals that Halifax is primarily a container port. The volume of non-container goods has fluctuated between 480 000 and 750 000 tonnes. This specialization in Halifax contrasts with Saint John and Montréal.

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[2] This period, which may be seen as a time of transition, inspired many experts to write articles and monographs on the changing role of ports in Eastern Canada. See among others: B. Brouillette, (1977), Canadian Maritime Transportation Centre (1978), R.A. Ffrench, (1979), J.C. Lasserre, (1979) & (1980), K.E. MacKinnon, (1980) and B. Riendeau, (1974) & (1977).

Table 5.1

VOLUME OF GENERAL CARGO TRAFFIC
IN CANADA'S MAIN EASTERN PORTS
1969-1981

(thousand tonnes)

Commodities/Port	1969	1970	1971	1972	1973	1974	1975[a]	1976	1977	1978	1979	1980	1981
General cargo													
Saint John	1 087.2	1 277.3	1 190.1	1 599.3	1 527.3	1 743.4	1 623.9	2 228.4	2 320.6	2 148.9	2 102.4	2 484.6	2 360.3
Halifax	809.5	728.8	1 125.1	1 559.9	1 670.1	2 097.9	1 859.8	1 442.2[b]	2 422.7[c]	2 341.0	2 619.5	2 537.0	2 342.9
Montréal	3 886.3	4 100.7	4 332.4	3 225.4	3 338.2	3 662.3	2 730.7	3 147.8	3 224.2[c]	3 700.4[d]	4 565.5[d]	4 767.5	5 120.0
Québec	766.2	916.2	1 172.8	1 045.2	997.8	1 109.4	598.8	958.7	942.4	761.4[d]	248.4	432.3	465.1
Trois-Rivières	463.8	452.2	358.9	299.3	242.8	213.6	226.8	345.3	255.8	299.9	229.6	217.8	215.5
Total	7 013.0	7 475.2	8 179.3	7 689.1	7 776.2	8 826.6	7 040.0	8 122.4	9 165.7	9 251.6	9 765.4	10 439.2	10 503.8
(i) **Containerized cargo**													
Saint John	45.4	81.5	125.5	310.9	445.5	409.0	480.8	970.2	995.4	920.8	897.7	864.3	920.5
Halifax	45.5	227.8	631.2	1 004.5	1 189.3	1 547.6	1 251.9	958.6[b]	1 779.2[c]	1 762.4[d]	2 082.7	1 935.4	1 785.8[e]
Montréal	450.0	823.0	1 157.7	1 132.9	1 558.6	1 609.4	1 188.4	1 543.0	1 618.4[c]	2 225.2[d]	3 050.9[d]	3 058.3	3 379.2[e]
Québec	83.4	272.7	546.7	621.7	771.4	776.2	453.6	653.7	718.2	579.0[d]	-	-	-
Total	624.3	1 405.0	2 461.1	3 070.0	3 964.8	4 342.2	3 374.7	4 125.5	5 111.2	5 487.4	6 031.3	5 958.0	6 085.5
(ii) **Noncontainerized cargo**													
Saint John	1 041.8	1 195.8	1 064.6	1 248.4	1 081.8	1 334.4	1 143.1	1 258.2	1 325.2	1 228.1	1 204.7	1 520.3	1 439.8
Halifax	764.0	501.0	493.9	555.4	480.8	550.4	607.8	483.5[b]	643.5	578.7	536.8	601.6	557.1
Montréal	3 436.3	3 277.8	3 174.7	2 092.5	1 779.7	2 053.0	1 542.2	1 604.8	1 605.8	1 475.2	1 514.6	1 709.2	1 740.8
Québec	682.8	643.5	626.1	423.5	226.4	333.2	145.2	305.0	224.2	182.4	248.4	432.3	465.1
Trois-Rivières	463.8	452.2	358.9	299.4	242.8	213.6	226.8	345.3	255.8	229.9[f]	227.3	214.3	213.6
Total	6 388.7	6 070.3	5 718.2	4 619.2	3 811.5	4 484.6	3 665.1	3 996.8	4 054.5	3 694.3	3 731.8	4 477.7	4 416.4

Notes: (a) Reduction in 1975 on account of the economic recession which affected international trade.

(b) Slowdown in port activity owing to a lockout in the port of Halifax in late 1976.

(c) The 1977 statistics for the ports of Montréal and Halifax cannot easily be compared with those of previous and subsequent years because of (1) a strike that paralyzed the port of New York, (necessitating diversions via Canadian ports) and (2) a disagreement in Montréal between the company CAST and the Montréal port authorities, which meant additional traffic for Halifax and less for Montréal. On the basis of the 1978 study entitled "The Economic Impact of the Port of Halifax" - see Table 7, op. cit. - we can establish the value of this temporary transfer of containerized goods between Montréal and Halifax at around 136 000 tonnes.

(d) At the end of 1978, CP Ships transferred its container services from the port of Québec to the port of Montréal. In addition the port of Halifax was affected by a six-week strike at Tim Containers Ltd.

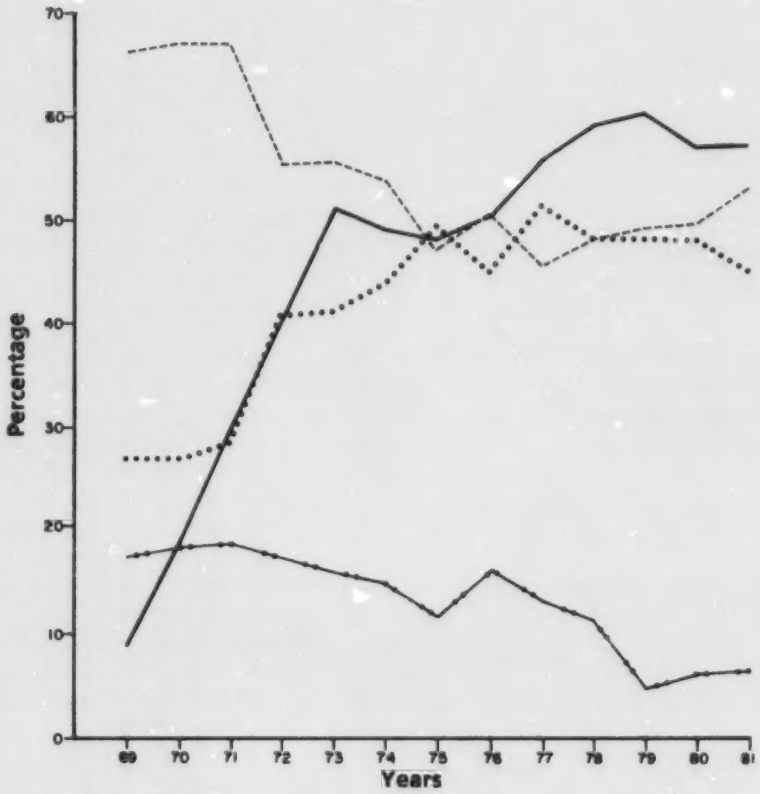
(e) In August 1981, Dart Containerline transferred its container services from the port of Halifax to the port of Montréal.

(f) Since 1978, the volume of containers handled by the port of Trois-Rivières has been negligible.

Source: Harbours Board Canada and sundry publications.

Figure 5.1

RELATIVE SHARE VARIATION FOR PORTS UNDER STUDY: GENERAL CARGO 1969-1981



Legend

---------- Relative shares, ports of Montréal and Québec

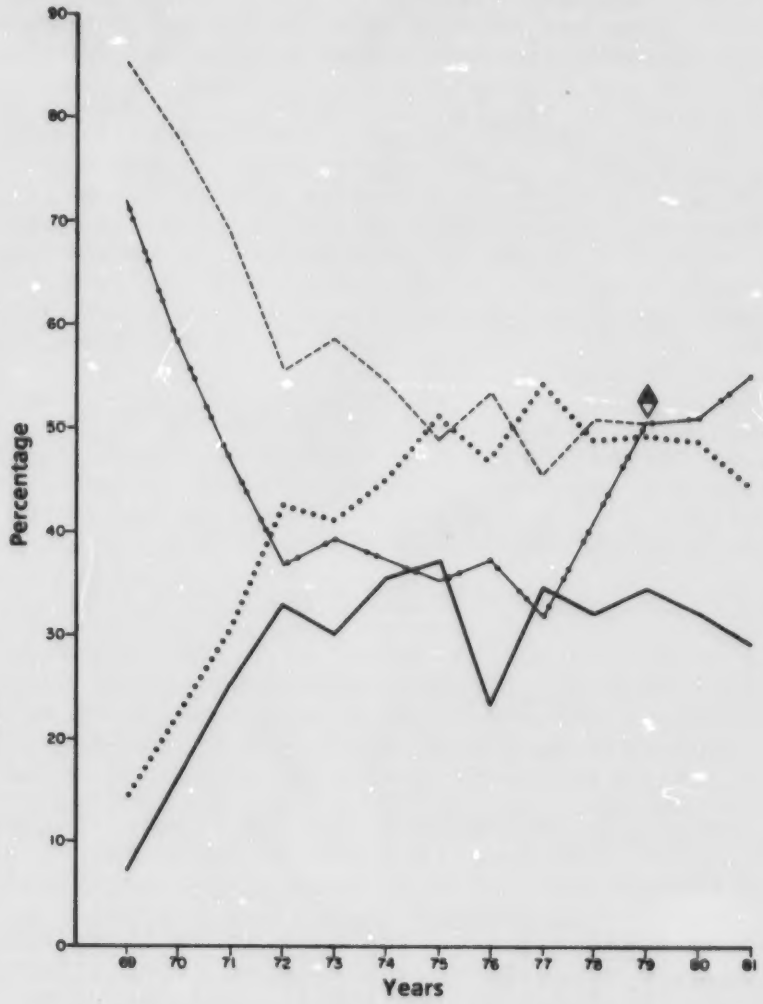
•••••••••• Relative shares, ports of Halifax and St. John

—•—•— Relative shares, ports of Québec and Trois-Rivières

—— Percentage of containerized general freight in total traffic of Eastern Canada's major ports

Source: Canadian Transport Commission, Transport Industries Analysis

Figure 5.2
PORT DISTRIBUTION OF CONTAINERIZED GENERAL CARGO TRAFFIC, 1969-1981



Legend

---------Ports of Montréal and Québec

—•—•—Port of Montréal

•••••••••Ports of Halifax and St. John

———Port of Halifax

◆ CP Navigations operations transferred from the port of Québec to the port of Montréal in 1978

Source: Canadian Transport Commission, Transport Industries Analysis.

Since 1975 the annual volume of non-container cargo handled in Montréal has been relatively stable at 1.5 to 1.7 million tonnes. This is 38% to 40% of all non-container traffic passing through the main ports of Eastern Canada. Saint John maintained a non-container volume of just over a million tonnes between 1969 and 1979 before reaching 1.5 million tonnes in 1980. Since 1978 Saint John has handled a third of the non-container traffic passing through the main ports of Eastern Canada.

Non-container traffic in the ports of Québec and Trois-Rivières showed a net decline between 1969 and 1979, while 1980 and 1981 were relatively stable years, with an annual traffic of around 200 000 tonnes at Trois-Rivières and half a million tonnes at Québec. Overall, we find that rationalizing of shipping services has had not only an adverse effect on the container traffic of these two ports; it also has reduced their roles in the handling of non-containerized general cargo. Québec has become mainly a bulk traffic port, and Trois-Rivières concentrates on provincial trade.

These general observations on changes in the organization of general cargo ocean shipping, based on changes in the composition and volume of traffic, merely reflect the results. In fact, port activity and intensity are based on the vitality of a port's commercial organization[3].

5.3 The Commercial Organization of a Port

The commercial organization of a port consists of shippers or international freight forwarders, ocean carriers and other agents that can be described as ocean shipping auxiliary services. In the case of the shippers and forwarders[4], the

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[3] This term ("organisation commerciale" in French) is borrowed from M. Fihey (1980) and comprises all economic agents directly or indirectly associated with port or shipping activities.

[4] Ocean shipping ancillary services play an equally important role in backing the activities of the three other groups of economic agents. Le Bureau de la Statistique du Québec (1980) and T. Pinfold (1979) published works which identify these services and measure their contribution to total port and shipping activities. The study by B. Riendeau (1974) establishes and analyzes an exhaustive list of factors that are considered by shippers and ocean carriers when deciding on a port. This study applies to Canadian and U.S. Atlantic ports. The article by J. Bird (1982) discusses a survey conducted among European shipowners on variables affecting the choice of port.

shipper--the owner of the commodities, or the forwarding agent, who organizes the shipment--usually chooses the port of exit. Their choice is based on, inter alia, cost of shipment, the efficiency with which the port is served by the various carriers, and the reliability of the port's services. The ocean carrier chooses as his main port of operations the one that seems most reliable and best served by overland transport services, taking into account accessibility, traffic flow and constraints imposed by his equipment. However, not all agents are attached indefinitely to a port.

Furthermore, market conditions or various institutional and organizational factors may induce them to transit their goods through a different port. To maintain a certain power of negotiation, forwarding agents, like the carriers, will tend to diversify the supply and dispatch routes for their traffic. Diversifying shipping routes can result in choosing a port outside national territory[5].

Port activity cannot be viewed as something separate or as an end in itself. On the contrary, it is becoming increasingly integrated into the entire system of transportation and distribution of goods that form a country's external trade. As expressed in an article in the Journal de la marine marchande, in a reference to French ports, ports are the lungs of our exchanges.

One of the features of Eastern Canadian ports is competition. To gain an understanding of how and why it develops, we must consider the general economic context of the ocean transport industry. A number of factors can intervene and bring about changes in the ocean transport structure. Many of them influence the decision making of agents directly or indirectly involved in port activity, even though these factors are often outside the control of port management. Examples:

1. Technological developments
   - handling and moving techniques
   - containerization and roll-on/roll-off
   - design and construction of special vessels
   - development of through transport

2. Intermodal and intramodal competition
   - need for economies of scale
   - rationalization of services

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[5] See M. Fihey (1980); J.M. Verhoeff (1977); S. Gilman (1977); and P. Bauchet (1982), Chapter 3, pp 333-352.

- market segmentation and differentiation
- liner company tariff policies and practices
- fluctuations in fuel prices
- operation of multimodal transport services

3. International factors
   - economic growth of commercial partnerships
   - fluctuations in exchange rates
   - development of competitive position by foreign ports (traffic diversion)
   - policy of foreign trading partner nations concerning conditions of sale agreements
   - establishment of and amendments to international conventions and agreements

4. Other national factors
   - national transport policy
   - organization of shippers
   - location of industrial zones
   - direction and concentration of our foreign trade
   - development of national transport networks
   - national policy on conditions of sale agreements
   - regional development policies

The changes in traffic patterns in the main ports of Eastern Canada, and the transfer of operations of certain major shipping companies recently and in the more distant past, support the thesis that ports cannot rely on permanent traffic and that shipping companies need not be attached to the same port. Moreover, by distinguishing between containerized goods and other cargo, we can identify containerization as the determining element and catalyst in creating Eastern Canada's present port structure.

5.4 The Container: More than Just a Cargo Unit

The conventional system, methods used to handle and move goods before containers were introduced, resulted overall in port zones whose hinterlands corresponded in most cases to well defined geographical regions. Some degree of competition was found between the larger ports, through their transit function. Water transport at that time featured multipurpose vessels. In addition there was a certain difficulty for other modes of transport and inland transport networks to link up with ocean shipping services. This lack of intermodal articulation restricted the expansion of a port's sphere of influence. To a large extent, a carrier's choice of port reflected his desire to keep down overland costs since these represented a significant proportion of the total transport cost.

Containers, because of the standardization of the cargo unit and its method of transportation, revolutionized long-distance transport, especially general cargo ocean shipping. After a period of adjustment, containerization led to an intermodal integration of services, and resulted in the development of the door-to-door transport system. This new system is coming into its own with the multimodal transport services now offered.[6]

Two major advantages of containers and through transport are a reduction in total transport costs and increased mobility of containerized goods. These advantages over the conventional system have altered the notion that a port benefits from shipments whose consignors, or consignees, are located relatively close by. A port's hinterland is much less protected than it might have been under the conventional system. Market proximity is no longer a guarantee for permanent traffic.

The remarkable expansion of Halifax seems to be largely attributable to the principle of increased mobility of containerized goods. As shown in Section 5.2, most of this port's traffic increases relate to container traffic. The statistics indicate no significant growth in the volume of general cargo transported in conventional crates. On the other hand, Québec and Trois-Rivières seem to be adversely affected by the container factor in relation to the other Eastern Canadian ports.

The study by R.P. Wilder and D.R. Pender (1979) shows that the benefit a port derives from being close to the point of origin or destination is mainly in products with a low value-weight ratio. These products generally are non-containerized merchandise. Those authors also state that the demand for shipping low value commodities has greater price elasticity than does the demand for shipping high value commodities.

One interpretation of these concepts is that the shipper of high value cargo bases his decisions on a certain cost-features vector of service, rather than simply on cost. This cost-features vector of service might include such variables as the time, regularity and frequency of services, and simplified procedures. This interpretation implicitly assumes containerization of commodities of high value. Moreover, containers reduce the forwarding cost of products as a proportion of total transport costs[7].

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[6] See D. Napier (1981), CTC (1982/03E) and J.L. Courtney (1982).

[7] For a more detailed consideration of the advantages and costs

As expressed by Van Den Burg (1975) in his book Containerization and Other Unit Transport, what really revolutionized transport is not so much containerization per se as the fact that containers "have become articles of transport equipment, essential parts of a freight forwarding concept which permits a door-to-door service, employing all means of transport, without intermediate handling of the cargo carried." (p 69)

However, direct and efficient routing of a commodity flow from an exporter to the importing client, with minimal interruption and delay depends on two precise operational factors. First, standard transport and cargo units used by the various agents involved, i.e. ".... the assembly into a single load of quantities of one or many different items of supply, in such a manner that it can be moved unbroken from source to a destination or use, as far forward as practicable[8]." Second, standard material handling equipment to ensure efficient transfer operations between the various modes when merchandise is rerouted. The combination of these two conditions provides optimum economy, flexibility and mobility of goods all along a transport chain that may include all modes--rail, road, sea and air.

5.5 Need for Investment in Facilities and Equipment

Obviously, major investments in infrastructures and superstructures had to be made to meet the requirements of the new transport system. Examples are the creation of a large stock of containers; the creation of port depots for handling, sorting and storing containers where trains and trucks can move and pick up cargo rapidly; the design of inland terminals adapted to intermodal container transport; and an adequate amount of port installations and equipment, public and private, for loading and unloading container vessels. The required superstructures include new types of unit trains, development of piggyback, complementing and combining rail and trucking, and design and construction of large vessels, either strictly for container transport, or adapted to both container and roll on-roll off cargo (combi carriers)[9].

Footnote Continued
attached to containerization, see CTC (1979), Report No. 20-79-05E.

[8] Van Den Burg (1975), op. cit., p 44.

[9] For more information on the development of infrastructures required for containerization, see CTC (1979), 20-79-05E, Chap. 4, pp 43-86; and CTC (1973), 00-73-09E.

Efficient operation of the system and profitability of this investment in facilities and equipment, however, require a) a high volume flow of containers, b) high volume use of the installations and equipment, and c) balanced two-way traffic between origin and destination. The economies of scale for a container transport system are based on large flows of traffic; the system can be implemented only in a limited number of seaports.

The traffic density requirement also explains the underlying reasons why intermodal terminals and freight consolidation are usually found only in specific geographical locations along inland transport routes. The substantial savings expected from a container transport system and the reduced cost by unit of transport capacity require rapid turnaround of containers, both on land and in ports. Overland container transportation, whether by rail, road or even inland waterway modes, has become important for the viability of ocean shipping services. For this reason the container is more than just a cargo unit for a vessel.

5.6 Integration of Transport Services: Multimodal Transport

The need for a rational operation of installations and equipment could only lead to cooperation among the carriers using the various modes. Each carrier is faced to a greater or lesser degree with high fixed costs which he naturally wants to offset by a high volume of traffic. Thus liner companies have established agreements with overland transport companies concerning organization and distribution of containerized freight, or to create subsidiaries dealing specifically in overland transport. Such action can be explained by the fact that water transport generally is regarded as the most costly link in the international through transport chain. Coordination of the various transport services, and vertical integration as practised by a number of ocean shipping companies, have facilitated the development of through transport and resulted in door-to-door multimodal transport.

The large investments made by the various liner companies has prompted them to form partnerships amongst themselves and to establish consortia on the densest routes. This horizontal integration of the operations of shipping companies--evidenced, for instance, by the coordination of schedules and joint operation of terminal installations--

constitutes a trend, in ocean shipping and international liner services, towards greater concentration.[10]

These decisions on rationalization, often taken by liner companies who are seeking economic benefits, may, however, entail any of a number of changes--relating to time, place, source, methods, new organization, new commercial orientation--so that it is difficult to generalize. The common objective is to obtain an optimum load factor per trip, thereby ensuring a greater spread of fixed operating costs.

We could argue that the phenomena of vertical integration of overland transport services and horizontal integration of shipping companies, resulting from containerization, have furthered rationalization of liner services. This rationalization process had already been evident in the commercial organization of liner transport, which was dominated by the system of liner conferences.

The liner conferences serving Canada operate under the Shipping Conferences Exemption Act, which, subject to certain conditions, permits restrictive trade practices and certain cooperation agreements between member carriers. While their operational models and characteristics may vary, these conferences have common features. They apportion among their members traffic quotas, call schedules and ports served. The arguments most often advanced to justify these arrangements and, indeed, the raison d'être of the conferences are that they enable members to obtain optimum cargos for each ship in port, to provide ports with an adequate and regular service, and to observe the standards governing ocean transport of merchandise, while at the same time promoting stability in freight rates.

Moreover, Canadian legislation does not prohibit the operation of integrated transport companies or the use of a single bill of lading or tariff for the movement of commodities by more than one mode.[11] Thus it has only become easier for

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[10] An international phenomenon involving both conference and non-conference liner companies. See G. Van Den Burg (1975), Chap 11, pp 126-149; CTC, Water Transport Committee (1982), WTC Decision 2-82; the papers presented by P. Camu and H.M. Romoff at the conference on "Canadian Perspectives on the UNCTAD Code of Conduct for Liner Conferences" (Proceedings), Government of Canada (1982); and the article by H.C. Kuiler (1977).

[11] See CTC (1973), Research Report 00-73-09E, Chap 5, pp 57-61 and Alan F. Friedlaender and Dan Harrington (1979). The United States authorized the operation of integrated transport companies only as of late 1982.

Canadian consignors to provide an integrated door-to-door transport service.

The Water Transport Committee recently published a decision (CTE2-82) concerning the coordinated container freight service of Canadian Pacific Steamship Ltd., Manchester Liners Ltd., and Dart Containerline (Canada).

> "At present, optimum rationalization of transport is being sought on an international scale. Multimodal transport is one of the essential elements of such rationalization and competition in this area is not between countries but between continents. As a result of more rapid routes, carriers and ports situated in different geographical regions are entering into direct competition. Multimodal transport requires strictly economic integration of, or cooperation between, different and competing modes of transport."

5.7 Segmentation of Ocean Shipping Services

As a direct consequence of the changes in the transport structure, differences between the shipping services catering to the various types of cargo have increased. The differences are largely in the installations and equipment required to move and handle bulk, container, conventional, and roll on-roll off cargo.

More particularly, there is segmentation in general cargo, and this affects the activities of the various ports that share or could share the same hinterland. This situation distinguishes quite well the four ports studied.

This analysis shows that the infrastructure needed for container transport is not economically feasible for a great number of ports, thus necessitating rationalizing of these services over a small number of ports. Other general cargo traffic also benefits from a certain concentration. Besides special installations, there are other determining factors, such as the need for a minimum traffic flow to support a liner shipping service, and the need to guarantee shipowners return freight. Commodities requiring special facilities are, for instance, chemical and related products, forest and related products, motor vehicles and certain foods. Other general cargo traffic does not require specific or costly installations. Such traffic can diversify port loads. This can help a port guard against relying on certain specific traffic. The port can reduce the negative effects of fluctuations that can alter domestic and

foreign demand for this traffic. This can produce some stability and less variation in traffic volume.

5.8 Conclusion

It is apparent that any comparative analysis of port activity in Eastern Canada would gain by examining the type of traffic and composition of Canadian exports. As indicated earlier, the nature of a port's general cargo trade is determined by the types of service offered by the shipping companies and by the overseas countries served. With these considerations, inland movements of commodities loaded in the various ports studied depend on four general factors:

1) methods of handling and overland routing which may require infrastructures designed to handle specific products;

2) shipping services whose itineraries are largely determined by rationalization of the routes operated by the liner companies;

3) the composition and importance of exports to our trade partners; and

4) the location of warehouse installations required for certain products.

The next chapter will deal with the organization of seaborne export trade in the four ports studied, on the basis of a macroanalysis of the composition and final destination of this trade. The analysis seems to substantiate the views expressed in this chapter.

Chapter 6

MACROANALYSIS OF THE FINAL DESTINATION OF GENERAL CARGO EXPORTED VIA THE PORTS STUDIED

The purpose of this chapter is to identify the major geographical destinations and general categories of Canadian exports loaded in each port studied.

6.1 Overview

The total value of Canadian exports of general cargo loaded in the four ports in 1981 was $6.7 billion. Table 6.1 shows Montréal as the principal port of exit with 44% of the total trade, while the Atlantic ports had just over 45%. The port of Québec's share was only 11%.

The role of each port in the distribution of Canadian seaborne trade is better illustrated by the figures for the seven overall export markets. Britain can be singled out from the Western European bloc because of the large volume of trade sent there.

First, Saint John is oriented mainly towards the countries of Asia, Oceania and South America. These three trade blocs comprised almost 70% of all the port's trade in 1981. Conversely, over two-thirds of the total value of exports to these markets were loaded at Saint John. Western Europe also took a significant portion of the exports loaded at Saint John, viz. 17%, or close to $262 million.[1]

Second, shipping services out of Halifax are destined mainly for Western Europe, particularly Britain. That bloc absorbed 59% of the trade, with the Middle East second at 15%. Only one country bloc is served chiefly by this port: the Middle East. On the other hand, only two blocs receive minimal trade from Halifax - South America and Africa.

Third, Montréal, like Halifax, serves most of the foreign markets. The exception is Oceania: in 1981, only 1.3% of its Canadian trade was loaded in Montréal. Most of Montréal's traffic centres on exports to Western Europe. Two-thirds of Canadian trade loaded in Montréal goes to that bloc and, conversely, 55% of the value of Canadian exports of general cargo

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[1] The next section will show that exports to Europe from Saint John do not vary much in content, unlike those destined for the three other groups of countries served mainly by this port.

Table 6.1

EXPORT MARKETS FOR GENERAL CARGO
LOADED IN THE PORTS STUDIED
1981

Port of Exit	Total Value ($ million)	Britain	Western Europe (Other)	Eastern Europe	Middle East	Oceania	Asia	Central America & Caribbean	South America	Africa	Total
		Percentage Distribution									
Saint John	1 566.7	5.3	8.3	19.7	14.7	17.4	62.3	27.1	64.0	2.5	23.5
Halifax	1 451.8	19.1	25.2	31.6	51.4	27.4	11.3	19.8	3.2	8.2	21.8
Montréal	2 912.5	69.7	47.8	48.7	18.0	1.3	22.0	49.1	28.4	61.9	43.7
Québec	737.9	3.1	18.7	-	15.8	-	4.4	4.0	4.3	27.4	11.1
Total	6 668.9	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Saint John	1 566.7	3.7	13.0	2.6	4.0	13.5	30.5	8.3	23.9	0.6	100.0
Halifax	1 451.8	16.7	42.4	4.4	15.0	5.6	6.0	6.5	1.3	2.0	100.0
Montréal	2 912.5	26.4	40.3	3.4	2.6	0.1	5.8	8.0	5.7	7.7	100.0
Québec	737.9	4.6	62.3	-	9.1	-	4.6	2.6	3.4	13.4	100.0
Total	6 668.9	16.5	36.8	3.1	6.3	4.4	11.5	7.2	8.8	5.4	100.0
		Distribution by Value ($ million)									
Saint John	1 566.7	58.7	203.2	40.0	62.4	211.8	477.5	129.6	374.4	9.1	
Halifax	1 451.8	241.6	617.4	64.3	217.3	81.3	86.5	94.6	19.0	29.7	
Montréal	2 912.5	768.7	1 172.4	99.2	76.1	3.8	168.8	234.3	165.9	223.3	
Québec	737.9	33.6	460.1	-	67.0	-	34.0	19.1	25.4	98.7	
Total	6 668.9	1 102.9	2 453.1	203.5	422.9	296.8	766.8	477.6	584.6	360.8	

Note: The dash (-) indicates nil value.

Source: Statistics Canada, External Trade Division.

to Western Europe is loaded in Montréal. Britain takes a good portion of Canada's trade, and exports from Montréal represent 70% of all Canadian goods shipped to Britain by the four ports studied. The second most important market for Montréal is Central America and the Caribbean, followed closely by the Africa. These markets, however, not insignificant in themselves, are more than eight times smaller, by value of trade, than is Western Europe. Also noteworthy is the fact that the great majority (62%) of exports to Africa is consolidated in Montréal.

Fourth, Québec shows an appreciable geographical concentration of its trade: 67% is to Western Europe and 13% to Africa. Québec is an important port for the African bloc, particularly Algeria: it handles 27% of the value of Canadian general cargo exported to that continent.

It would seem from this overview that traffic is shared among the four ports approximately according to the principal overseas destinations served. Division of exports into the five general commodity groups confirms this impression.

6.2 Final Destination of Trade

Table 6.2 shows the total value of trade loaded in each port studied, by major group of commodities, and by country of final destination. Tables 6.3 and 6.4 identify the main components of each commodity group and indicate the relative importance of each country bloc to which these commodities were exported in 1981. Tables 6.3 and 6.4 are given at the end of Section 6.2.

6.2.1 Western Europe

Trade destined for the Western European countries constitutes the most important route for general cargo exports, i.e. 53% of all trade loaded in the four ports. Montréal and Halifax dispatch almost 80% of the total value of this trade (55% and 24%).

It can be seen from Table 6.2 that Montréal and Halifax are the two main loading ports for three groups of commodities: Foods, Feed, Tobacco and Beverages; Industrial and Agricultural Machinery, and Transportation and Communication Equipment; and Other End Products. The general characteristics of these products are a) high unit value, b) most are containerized, and c) they include the commodity categories for which quality transport service is generally required.

These three broad commodity groups, in spite of totalling almost $1 billion, account for only 27% of all Canadian exports to Western Europe. Fabricated Materials, including wood

Table 6.2

DISTRIBUTION OF SEABORNE EXPORTS
BY MAJOR GROUP OF GENERAL CARGO
AND COUNTRY BLOC OF DESTINATION
OVERSEAS TRADE - 1981
($ million)

Commodity Group and Destination	Seaport of Exit				Total Value
	Saint John	Halifax	Montréal	Québec	
Foods, feed, beverages and tobacco					
Western Europe	4.4	231.9	191.7	0.1	428.1
Eastern Europe	27.9	38.5	13.6	-	80.0
Middle East	1.6	15.1	4.0	3.9	24.7
Africa	0.1	3.5	11.7	39.0	54.4
Asia	69.8	11.5	0.7	0.1	82.1
Oceania	12.8	7.1	0.1	-	20.0
South America	7.7	1.8	16.4	N/A	25.9
Central America and Caribbean	102.6	66.8	78.2	-	247.6
Total	226.8	376.4	316.4	43.1	962.7
Crude materials, inedible					
Western Europe	19.6	127.3	379.3	349.6	875.8
Eastern Europe	1.7	15.7	15.9	-	33.3
Middle East	4.2	1.8	10.7	7.2	24.0
Africa	4.2	0.9	18.5	0.4	23.9
Asia	105.6	31.1	39.8	9.9	186.4
Oceania	14.2	6.9	0.3	-	21.3
South America	6.4	0.6	11.4	0.3	18.6
Central America and Caribbean	0.2	1.7	2.3	-	4.2
Total	155.9	185.9	478.2	367.3	1 187.5
Fabricated materials, inedible					
Western Europe	230.3	312.6	1 014.1	143.5	1 700.4
Eastern Europe	10.3	5.2	45.3	-	60.8
Middle East	34.0	20.1	21.1	65.5	130.6
Africa	3.3	4.6	49.7	7.5	65.1
Asia	215.6	35.0	60.3	24.0	334.8
Oceania	68.5	29.9	2.3	-	100.6
South America	63.0	5.5	75.4	24.8	168.6
Central America and Caribbean	21.5	14.5	96.0	18.3	150.2
Total	646.3	427.2	1 364.1	273.5	2 711.2
Industrial and agricultural machinery; transportation and communication equipment					
Western Europe	4.4	100.8	191.0	0.4	296.6
Eastern Europe	0.1	3.8	22.5	-	26.5
Middle East	14.9	176.4	14.4	-	205.7
Africa	1.4	17.8	109.0	5.1	133.3
Asia	45.1	2.2	57.6	-	104.9
Oceania	66.6	19.1	0.1	-	85.8
South America	286.8	11.0	46.8	0.3	344.9
Central America and Caribbean	1.8	6.5	28.4	0.4	37.1
Total	421.1	337.6	469.9	6.1	1 234.7
Other end products					
Western Europe	3.3	86.3	165.0	0.2	254.8
Eastern Europe	-	1.1	2.0	-	3.1
Middle East	7.7	3.9	25.8	0.4	37.9
Africa	0.2	3.0	34.3	46.7	84.2
Asia	41.5	6.7	10.5	N/A	58.7
Oceania	49.8	18.2	1.1	-	69.1
South America	10.6	0.2	15.9	0.1	26.7
Central America and Caribbean	3.5	5.2	29.4	0.4	38.5
Total	116.6	124.5	283.9	47.9	572.9

Notes: A dash (-) indicates no value.
N/A - not applicable.

Source: Statistics Canada, External Trade Division.

products, chemical products, textile fabricated materials and nonferrous metals, make up 48% of the total value of exports to that bloc. The remaining 25% consists of Crude Materials, particularly crude nonmetallic minerals.

A study by the Research Branch of the Canadian Transport Commission on the unit value of nonbulk products in Canadian overseas trade[2] shows that nonbulk, but generally also non-containerized, products comprise mainly the fabricated materials and crude materials groups. It would therefore be reasonable to attribute a lower containerization factor to those two groups than can be accorded to the three other groups [3].

Consequently, crude and fabricated materials can be broadly regarded as a mixed freight category, requiring port installations and equipment for both containers and conventional cargo. Ocean transport of these commodities can be successfully handled by multipurpose vessels[4]. Statistics on the distribution of trade in these commodities by port of exit seem to support these notions.

Almost the entire trade destined for Western Europe and passing through Québec (which can handle conventional freight) and Saint John (which is equipped with a variety of installations) consists of crude fabricated materials. Halifax exports far fewer of these commodites than does Montréal.

Of the seven shipping companies providing Halifax with a regular service to Western European destinations, six offer either entirely containerized or combi services. Most of the nonspecialized services are provided only occasionally or seasonally. In Montréal four regular services[5] are nonspecialized container services and five others are specialized. Saint John and Québec offer considerably fewer services to Western Europe. These services are mainly nonspecialized container services (see Appendix F).

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[2] Canadian Transport Commission, Research Branch, Unit Values of Commodities Moving in Canadian Overseas Trade, Appendix F, pp 114-116, Report No. 20-78-01E.

[3] This does not alter the fact that sophistication in the use of containers or a high density of two-way traffic can make containerization of products a worthwhile economic proposition.

[4] These vessels can combine non-containerized with containerized cargos.

[5] I.e. year-round services.

6.2.2 Asia and Oceania

Canadian seaborne exports to Asia and Oceania amounted to just over $1 billion in 1981, i.e. 16% of the total value of trade loaded in the ports studied. Of this second major market, 70% the exports to Asian countries consisted of goods produced from crude or fabricated materials, while exports to Oceania comprised for the most part fabricated materials, industrial and agricultural machinery and other end products.

Saint John is clearly the principal port for liner companies serving Oceania (mainly Australia and New Zealand) from the Atlantic seabord. The only other port in this market is Halifax, with a market share of 27% in 1981. The merchandise loaded in this port is divided fairly evenly into the three main commodity groups of the Asia-Oceania export market.

The Asian countries are also served chiefly from Saint John, although we have to consider certain other facts here. Over 90% of exports to Japan are loaded in Saint John, exports to Japan representing 36% of the total value of trade destined for Asia. For exports to Asian countries other than Japan, however, the ports of Montréal and Halifax play a significant secondary role in respect of fabricated materials.

Montréal is the main port for exports to the People's Republic of China. The dominant exports to this market are pulp and chemical and related products. Montréal is also an important secondary port for railway rolling stock and general industrial machinery exported to Asian countries other than Japan and China. These two categories of merchandise alone represent over 60% of the $57.6 million in industrial and agricultural machinery, and transportation and communication equipment loaded in Montréal in 1981.

To summarize, Saint John comes out as the main port of dispatch for commodities shipped to Asia. Montréal, and to a lesser extent Québec, are important secondary loading ports for mainly non-containerized commodities exported to Asian countries other than Japan. Halifax plays a significant secondary role, focusing mainly on container transport. Two shipping companies offer fully containerized regular services from this port to Asia and Oceania, while nonspecialized container services are also provided either during the winter season or on the basis of a minimum load (Appendix F).

6.2.3 South America, Central America and the Caribbean

Canadian export trade to South American countries amounts to $600 million, of which approximately 45% consists of

motor vehicles and parts. The total value of exports to Central America and the Caribbean is almost half a billion dollars. Foods make up the bulk of these.

Canadian exports of motor vehicles and parts are practically all shipped from Saint John. Aside from these, Canadian exports to South America comprise mainly fabricated materials and various end products. Foods and inedible crude materials represent only 13% of the remaining trade. We can offer two observations from Appendix F: 1) no fully containerized service to South America was offered in 1981 and 2) Montréal and Saint John are the loading ports for the overwhelming majority of carriers serving South America[6].

Table 6.2 reflects these observations. Halifax is only slightly oriented towards the South American countries, while Montréal and Saint John are the two principal loading ports for shipping companies serving that market. Except in the case of motor vehicles and parts, the two ports have a more or less equal share of trade to South America.

The export markets of Central America and the Caribbean are somewhat more complex. The location of these markets seems to have favoured an integration of liner services for this bloc with services to South America. A comparison of the list of shipping companies offering nonspecialized container services to Central America and the Caribbean with the companies serving South America (see Appendix F) would seem to support this view[7]. Only one of the seven shipping companies providing nonspecialized services to Central America and the Caribbean is not listed also among the companies serving South America. This explains why Montréal and Saint John have a greater share of the trade exported to this bloc.

It would also be reasonable to suggest that part of the trade destined for Central America and the Caribbean can be transported by certain shipping companies serving Asia and Oceania.[8] These companies can benefit from capturing part of

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[6] For a specific study of the South American market, consult Maritime Trade Between Canada and the East Coast of South America, Canadian Transport Commission, Water Transport Committee (International Maritime Study Unit), March 1983 (especially pp 16-33).

[7] The confidential statistics on conference and nonconference liner traffic in 1978 and 1979 also substantiate this claim.

[8] The Directory of Ocean Containership Services published by the Atlantic Provinces Transportation Commission confirms that

this traffic, especially if it is containerized, by using a shipping route through the Panama Canal. It is implied that a low incremental cost is incurred from a stop at a port in this region.

To summarize, Saint John and Montréal emerge as the main loading ports for general cargo exported to the countries of South and Central America and the Caribbean. Halifax also has a significant role in the distribution of exports to Central America and the Caribbean, with a 20% share of that market.

6.2.4 Africa

Canadian exports to African countries have a total value of $361 million. Sixty percent of them consist of industrial and agricultural machinery and various end products. In 1981 Africa was the second most important export market, after Western Europe, for end products other than motor vehicles and parts[9]. Other commodity groups exported to this bloc are fabricated materials and foods. Crude materials constitute only a small proportion of the value of exports to this bloc.

Montréal is the principal loading port for African trade. Table 6.2 indicates that Québec also has a substantial share of this market. A closer examination of trade passing through this port reveals that over 85% of Africa-bound exports loaded in Québec go to Algeria and that, conversely, 80% of the Algerian market is served out of this port. Algeria's considerable imports of dairy products and Québec's warehousing facilities for dairy products largely account for the substantial volume of trade exported to Algeria from this port.

At first glance the list of liner companies serving Africa (Appendix F) and the low figures for the ports of Halifax and Saint John (Table 6.2) may not seem to go together. From other sources, we found that the volume of traffic provided by many of these liner companies is light. Most of the trade is actually handled by only three or four carriers who offer

Footnote Continued

certain shipping companies operating out of Halifax and Saint John offer such feeder services.

[9] Disregarding exports to Western Europe and the value of foreign sales of motor vehicles and parts, the African market absorbs 27% of Canadian exports of industrial and other end products.

nonspecialized container service. These carriers operate for the most part out of Montréal[10].

Nevertheless the two fully containerized liner services operating out of Halifax provided this port with a market share in 1981 was nine percent of the total value of foods, general industrial products and other end products exported to Africa.

The Directory of Ocean Containership Services, produced annually by the Atlantic Provinces Transportation Commission, shows that these two fully containerized services jointly serve the Canadian-African (West) and American-African markets. Each voyage involves regular stops at the American ports of New York and Baltimore. One of these services operates via the Mediterranean, which requires transshipment of the containers and rerouting by land or by sea before the containers reach their final destination in Africa.

6.2.5 Eastern Europe and the Middle East

Not counting motor vehicles and parts, inedible fabricated materials and miscellaneous foods represent 70% of Canada's exports to Eastern Europe and 57% of exports to the Middle East. Only a small proportion of end products, whether industrial or consumer goods, are shipped to these blocs.

Owing to the volume of trade, there are two types of ocean shipping service to the Eastern bloc countries: 1) direct services to Polish ports on the Baltic Sea and Yugoslav ports on the Adriatic, and 2) services integrated with Western European ports. This system is based on the heavy flow of traffic desired by the shipoperators and accounts for the concentration of Western Europe-bound trade in Halifax and Montréal.

Not counting motor vehicles, which are loaded mainly in Halifax[11], commodities destined for the Middle East are distributed among the ports studied according to type of merchandise. Whereas the majority of non-containerized goods are dispatched via Saint John and Québec, most other commodities are exported from Halifax and Montréal.

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[10] This claim is substantiated by the confidential statistics on the volume of liner traffic provided by the various companies involved in this market in 1978 and 1979.

[11] Exports of motor vehicles and parts represent $151.4 million of the $176.4 million of Industrial and Agricultural Machinery, and Transportation and Communication Equipment loaded in Halifax and dispatched to the Middle East.

Table 6.3

EXPORT MARKETS FOR MAIN GENERAL CARGO
LOADED IN THE PORTS STUDIED
1981

Description of Commodities*	Total Value ($ mil)	Percentage Distribution: Britain	Western Europe (Other)	Eastern Europe	Middle East	Oceania	Asia	Central America & Caribbean	South America	Africa	Total
I- Foods, feed, beverages and tobacco											
(01)* Meat and meat preparations	47.8	9.4	8.6	0.3	0.2	3.5	62.8	14.2	0.2	0.7	100
(03) Fish	237.9	27.1	44.6	1.6	0.7	3.9	7.1	13.6	1.0	0.5	100
(05) Dairy products and honey	93.4	17.7	9.9	0.1	4.4	0	7.4	15.3	1.4	43.8	100
(06) Cereal products	196.6	2.2	1.9	27.5	6.7	0.1	0.7	55.5	2.8	2.5	100
(07) Fruit and fruit preparations	31.9	24.6	68.2	-	0.2	0.3	3.4	3.0	-	0.2	100
(09) Vegetables and vegetable preparations	107.1	26.8	29.2	N/A	2.4	4.8	4.3	28.2	3.4	1.0	100
(10) Sugar and sugar preparations	41.6	2.3	4.2	28.0	N/A	0.9	0.9	52.9	10.7	N/A	100
(14) Other foods, food materials and food preparations	76.9	9.4	33.0	0.4	6.2	3.8	18.3	13.0	7.9	8.0	100
(18) Tobacco	96.1	70.3	15.1	-	0.3	1.2	9.8	0.8	-	2.5	100
II- Crude materials, inedible											
(20) Crude animal products, inedible	53.4	6.3	34.6	23.8	1.0	N/A	33.7	0.3	N/A	0.3	100
(21) Crude vegetable products, inedible	36.5	7.6	41.7	0.5	1.3	0.6	47.7	0.2	0.3	N/A	100
(24) Textile and related fibres	32.1	2.5	3.7	-	-	41.7	41.2	1.2	8.2	1.4	100
(25) Ore concentrates and scrap	739.8	32.5	62.7	0.4	-	0.1	4.1	-	0.2	-	100
(27) Crude nonmetallic minerals	318.0	6.0	34.0	5.4	7.2	2.3	32.7	1.1	4.4	6.9	100
III- Fabricated materials, inedible											
(33) Wood fabricated materials	191.2	21.9	35.6	0.2	31.2	0.5	4.1	4.2	0.4	1.8	100
(34) Pulp	318.8	14.0	54.0	4.3	1.0	0.1	22.9	1.7	1.3	0.7	100
(35) Paper and paperboard	257.7	21.4	9.1	N/A	0.8	3.1	21.1	16.6	25.3	2.6	100
(36) Textile fabricated materials	133.9	23.7	28.3	5.5	3.4	13.6	9.1	4.4	6.9	5.2	100
(40) Chemical and related products	801.3	8.7	64.5	3.2	1.7	4.5	7.2	6.0	2.9	1.2	100
(44) Iron and steel products	78.9	9.2	34.9	N/A	2.9	10.0	23.7	11.0	6.9	1.5	100
(45) Nonferrous metals	764.4	25.4	45.2	N/A	4.7	1.8	12.0	2.3	6.6	2.1	100
(46) Metal fabricated basic products	75.8	14.3	24.2	12.5	6.0	7.9	8.2	10.5	5.3	11.0	100
IV- Industrial and agricultural machinery, and transportation and communication equipment											
(50) General Purpose Industrial Machinery	126.5	4.5	19.4	0.9	9.9	6.6	32.5	1.9	18.9	5.4	100
(51) Conveying, elevating and material handling equipment	39.8	10.8	36.7	0.9	0.5	5.2	7.9	19.9	6.3	11.8	100
(52) Special industry machinery	257.9	8.4	33.0	2.1	5.1	5.1	8.6	1.8	14.1	21.7	100
(57) Railway rolling stock	80.2	-	4.7	0.1	19.1	1.0	15.0	10.4	7.8	41.9	100
(58) Road motor vehicles	579.6	1.3	7.9	2.4	26.3	9.4	2.2	0.3	46.3	3.9	100
(63) Communication and related equipment	80.3	17.0	53.3	N/A	12.5	3.0	3.4	1.7	5.1	3.9	100

* The Statistics Canada two-digit export commodity classification number is given in brackets.

Source: Statistics Canada, External Trade Division.

Table 6.4

EXPORT MARKETS FOR MAIN GENERAL CARGO
(END PRODUCTS) LOADED IN THE PORTS STUDIED
1981

Commodity Class*	Total Value ($ mil)	Percentage Distribution									
		Britain	Western Europe (Other)	Eastern Europe	Middle East	Oceania	Asia	Central America & Caribbean	South America	Africa	Total
(65-69) Electrical equipment and appliances	144.8	18.3	20.8	0.2	7.3	10.0	13.2	11.5	7.1	11.6	100
(70-73) Specialized equipment and apparatus	55.7	14.3	31.9	2.1	3.8	7.9	8.1	2.1	14.3	15.3	100
(74-77) Household and office furniture and accessories	67.0	28.1	34.7	N/A	1.7	14.9	7.3	6.7	3.2	3.4	100
(78-86) Miscellaneous household and personal articles	109.0	21.6	39.4	1.0	3.1	21.6	6.6	4.0	1.2	1.4	100
(87-88) Pharmaceutical products and medical supplies	30.9	4.5	54.3	0.1	10.3	7.7	6.2	9.3	3.3	4.3	100
(89-92) Printed matter and photographic goods	48.6	23.5	34.4	0.9	1.1	19.0	3.6	9.8	4.1	3.6	100
(93-96) Other end products	146.8	5.5	14.0	N/A	13.0	5.7	15.9	5.3	2.8	37.8	100
Group total	572.8	16.0	28.5	0.5	6.6	12.1	10.2	6.7	4.7	14.7	100

* Each class is preceded by bracketed two-digit commodity classification numbers denoting the commodity categories in the class. Appendix H lists the values of Canadian exports in these categories by port of exit.

Source: Canadian Transport Commission, Transport Industries Analysis.

6.3 Conclusion

The country blocs served from the four ports studied and the type of commodities exported have confirmed some of the hypotheses expressed in the last chapter. We reached the following conclusion.

If the overseas destination of a port's trade is directly connected to the shipping routes that shipping companies operate from this port, the composition of this trade will reflect, first, the kind of exports destined to the countries served by these companies; and, second, the types of service offered by these companies from this port. Other equally important factors also affect the composition of cargo handled at any port. These include traffic volume, balance between outbound and inbound traffic, and compatibility of export traffic with import traffic regarding the handling equipment required.

Table 6.5 summarizes the configuration of Canadian trade loaded in each of the ports. The horizontal axis gives the percentage distribution of 1981 trade by port, while the vertical axis gives a break-down of the trade for each port.

To highlight certain characteristics of the trade in these ports, motor vehicles and parts have been separated from other general commodities. Fabricated materials and crude materials have been grouped together, and the group "end products" includes industrial and agricultural machinery, and communication equipment as well as other end products.

Despite its aggregate nature, Table 6.5 substantiates two other claims made in the preceding chapter.

First, with respect to the dual premise that industrial and household consumer goods are produced mainly in the provinces of Ontario and Quebec, and that these goods are largely containerized, the table confirms that there is greater mobility of containerized trade. Halifax and Saint John shared 42% of this trade. In addition, almost two-thirds (62.7%) of food exports were loaded in these two Atlantic ports [12]. On the other hand, only 36% of crude and fabricated materials, generally associated with a lower containerization factor, were exported from these ports. The Atlantic ports, however, particularly Saint John, dominate Canadian seaborne exports of motor vehicles and parts with a good 80% share of this trade.

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[12] Chapter 8 will show that the Atlantic provinces generated only 13% of all Canadian exports loaded in the ports studied.

Table 6.5

AGGREGATE CANADIAN OVERSEAS EXPORTS
PASSING THROUGH THE PORTS STUDIED IN 1981
(Percentages)

Type of General Commodity	Port of Exit: Saint John		Halifax		Montréal		Québec		Total	
Foods	23.6	(14.5)	39.1	(25.9)	32.9	(10.9)	4.5	(5.8)	100	(14.4)
Crude and fabricated materials	20.6	(51.2)	15.7	(42.2)	47.3	(63.3)	16.4	(86.9)	100	(58.5)
End products	18.5	(14.5)	23.5	(20.0)	53.8	(22.6)	4.2	(1.8)	100	(18.4)
Motor vehicles and parts	53.6	(19.8)	29.9	(11.9)	16.1	(3.2)	0.5	(0.4)	100	(8.7)
Total	23.5	(100.0)	21.8	(100.0)	43.7	(100.0)	11.1	(100.0)	100	(100.0)

Source: Canadian Transport Commission, Transport Industries Analysis.

Second, Québec has an edge over the other ports only in crude and fabricated materials. Generally non-containerized, these commodities make up more than four fifths of the total value of trade loaded in this port.

To summarize, these statistics reveal a relative segmentation of shipping services. The statistics for 1981 show:

a) a 62.7% concentration of food products is loaded in Halifax and Saint John;

b) a 67.9% concentration of generally non-containerized cargo is loaded in Montréal and Saint John, and to a lesser extent in Québec, whose trade structure is dominated by such commodities;

c) a 78.7% domination of shipping services to Western Europe by Montréal and Halifax;

d) a 83.5% domination of shipping services for motor vehicles by Saint John and Halifax;

e) a concentration in Saint John of shipping services to Asia (62%) and Oceania (71%);

f) that, in general, Montréal and Saint John have a greater number of carriers offering regular year-round nonspecialized container services than does Halifax (Appendix F); and

g) that South America, Central America and the Caribbean are chiefly served by Montréal and Saint John, while the African countries are served mainly by Montréal.

Chapter 7

COMPARATIVE ANALYSIS OF THE ACTIVITIES OF THE FOUR PORTS STUDIED

The four ports studied share two important features: first, they are located in the same broad geographical region; and, second, they have the same national hinterland--a hinterland which, all things considered, is relatively restricted, compared with the hinterlands of other major ports on the American continent or overseas. As has been seen in the previous chapter, these two factors have resulted in some specialization in each port.

This chapter describes in more detail the commodities handled in each port and offers general comments on each port's share of the market.

7.1 Distribution of Canadian Exports by Port

This section gives a picture of Canadian general cargo trade passing through each port. A classification system comprising 25 classes has been designed, based on the two-digit code of the Canadian export commodity classification scheme. Table 7.1 gives the trade structure of each of the ports according to these classifications. Table 7.2 provides a similar list but shows only the major commodity categories as identified by the Statistics Canada two-digit code.[1]

7.1.1 Québec

Québec clearly emerges as a port specialized in the handling of crude and fabricated materials. Its activities centre on three categories: ore concentrates and metal scrap (50%); wood fabricated materials, paper and paperboard (21%); and chemical and related products (13%) - see Table 7.1. Two other commodities are significant: dairy products and the other end products group.

Québec's share of commodities handled by the four ports (Table 7.2) helps to define its role in the distribution chain of

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[1] Appendix H gives a list of "end product" categories whose total export value exceeds $5 million. These commodities are grouped according to port of exit.

Table 7.1

DISTRIBUTION OF CANADIAN OVERSEAS EXPORTS
BY PORT OF EXIT - 1981
($ thousand)

Commodities	Port of Exit				
	Québec	Montréal	Halifax	Saint John	Total
I Foods, feed, beverages and tobacco					
(1) Fish, meat and meat preparations	133.7	80 026.9	140 557.9	64 979.8	285 698.3
(2) Dairy products	42 840.7	26 453.7	16 784.5	7 271.5	93 350.4
(3) Cereal and fruit preparations	1.5	47 451.8	116 688.3	64 394.9	228 536.6
(4) Other foods and food preparations	27.8	119 112.6	54 165.3	78 975.9	252 281.6
(5) Beverages and tobacco	89.3	43 318.4	48 191.1	11 209.6	102 808.4
Total	43 091.4	316 363.4	376 387.1	226 831.7	962 673.7
II Crude materials, inedible					
(6) Miscellaneous crude materials	902.3	34 467.4	46 774.6	42 055.2	124 199.4
(7) Ore concentrates and scrap	366 445.9	443 774.1	139 167.1	113 874.2	1 063 261.3
Total	367 348.2	478 241.4	185 941.6	155 929.4	1 187 460.7
III Fabricated materials, inedible					
(8) Leather, furs and rubber fabricated materials	0.0	5 158.4	4 947.8	3 593.7	13 700.0
(9) Wood and paper	158 989.6	152 500.5	107 269.2	348 984.5	767 743.9
(10) Textiles	642.8	73 582.4	32 723.8	26 949.7	133 898.8
(11) Oils and fats	9 404.3	1 285.6	1 859.3	738.5	13 287.8
(12) Chemical and related products	96 584.6	490 358.7	151 792.5	63 601.2	802 337.1
(13) Iron and steel products	1 271.3	36 735.5	14 256.0	26 626.2	78 889.1
(14) Nonferrous metals	6 599.6	604 488.0	114 391.5	175 823.8	901 302.8
Total	273 492.4	1 364 109.2	427 240.2	646 317.6	2 711 159.4
IV Industrial and agricultural machinery: transportation and communication equipment					
(15) Industrial machinery	2 914.7	263 219.9	84 973.9	73 072.1	424 180.5
(16) Agricultural machinery	0.0	20 087.9	5 998.5	3 303.3	29 389.7
(17) Transportation equipment	3 208.9	144 043.5	216 147.2	337 434.4	700 833.9
(18) Communication equipment	0.0	42 526.0	30 500.7	7 249.1	80 275.8
Total	6 123.5	469 877.3	337 620.2	421 058.9	1 234 679.9
V Other end products					
(19) Electrical equipment and appliances	870.3	73 496.5	21 000.4	19 399.9	114 767.1
(20) Special equipment	121.7	33 645.3	10 491.1	11 484.7	55 742.8
(21) Household and office furniture & accessories	36.9	34 426.2	19 018.4	13 527.7	67 009.2
(22) Miscellaneous household articles	2.2	48 233.9	35 476.3	25 316.9	109 029.2
(23) Medical and pharmaceutical products	0.0	17 642.7	8 788.7	4 457.8	30 889.1
(24) Printed matter and photographic goods	177.1	26 702.6	11 795.6	9 909.8	48 585.2
(25) Miscellaneous end products	46 664.6	49 714.1	17 971.7	32 477.6	146 828.0
Total	47 872.7	283 861.4	124 542.3	116 574.3	572 850.6
Grand Total	737 929.8	2 912 474.3	1 451 758.1	1 566 712.0	6 668 874.2

Source: Canadian Transport Commission, Transport Industries Analysis, on the basis of special tables produced by Statistics Canada, External Trade Division.

Table 7.2

DISTRIBUTION OF OVERSEAS EXPORTS
OF GENERAL CARGO EXCLUDING "OTHER END PRODUCTS",
BY PORT OF EXIT
1981

Commodities*	Total Value ($ million)	Seaport of Exit: Québec (%)	Montréal (%)	Halifax (%)	Saint John (%)
I- Foods, feed, beverages and tobacco					
(01) Meat and meat preparations	47.8	0.3	17.2	16.8	65.7
(03) Fish	237.9	N/A	30.2	55.7	14.1
(05) Dairy products and eggs and honey	93.4	45.9	28.3	18.0	7.8
(06) Grain, flour and cereal preparations	196.6	N/A	22.9	45.0	32.1
(07) Fruit and fruit preparations	31.9	0.0	7.7	88.6	3.7
(09) Vegetables and vegetable preparations	107.1	0.0	47.8	20.8	31.4
(10) Sugar and sugar preparations	76.9	0.0	49.5	3.0	47.5
(14) Other foods and food preparations	41.6	0.1	42.5	42.6	14.8
(18) Tobacco	96.1	0.0	41.4	48.0	10.6
II- Crude materials, inedible					
(20) Crude animal products	53.4	0.0	30.1	53.3	16.6
(21) Crude vegetable products	36.5	2.5	21.5	31.3	44.7
(24) Textile and related fibres	32.1	0.0	32.0	19.1	48.9
(25) Metal ores, metal in ores, concentrates and scrap	739.8	44.9	38.8	13.6	2.7
(27) Crude nonmetallic minerals	318.0	10.5	48.8	11.9	28.8
III- Fabricated materials, inedible					
(35) Wood fabricated materials	191.2	30.3	22.1	27.8	19.8
(34) Pulp	318.8	1.0	21.8	8.9	68.3
(35) Paper and paperboard	257.7	38.0	15.8	10.0	36.2
(36) Textile fabricated materials	133.9	0.5	55.0	24.4	20.1
(40) Chemical and related products	801.3	12.0	61.2	18.9	7.9
(44) Iron and steel products	78.9	1.6	46.6	18.1	33.7
(45) Nonferrous metals	764.4	0.7	68.3	11.9	19.1
(46) Metal fabricated basic products	75.8	1.2	64.3	16.4	18.1
IV- Industrial and agricultural machinery, and transportation and communication equipment					
(50) General Purpose Industrial Machinery	126.5	0.3	54.0	25.2	20.5
(51) Conveying, elevating and material handling equipment	39.8	4.0	74.5	10.3	11.2
(52) Special industry machinery	257.9	0.3	64.1	19.1	16.5
(57) Railway rolling stock	80.2	0.2	39.3	42.1	18.4
(58) Road motor vehicles	579.6	0.4	16.1	49.4	34.6
(63) Communication and related equipment	80.3	0.0	53.0	38.0	9.0

* The Statistics Canada two-digit export commodity classification number is given in brackets. This list of commodities covers 97% of all trade in the four major groups of commodities handled by the ports studied.

Source: Statistics Canada, External Trade Division.

Canadian overseas trade. In 1981, Québec loaded 45% by value of all ore concentrates and scrap and dairy products passing through the four ports. It also had a 38% share of paper and paperboard and a 30% share of wood fabricated materials.

The country blocs receiving these commodities are limited. Western Europe absorbs almost all exports of ore concentrates and scrap[2]; approximately 90% of wood fabricated materials go to the Middle East; and over 90% of dairy products and other end products loaded in Québec are exported to Africa, mainly Algeria. Only paper and paperboard have a relative diversity of markets.

In summary, as far as general cargo is concerned, Québec is specialized not only in the commodities it handles but also in the final destinations of these commodities. In 1981 about two-thirds of the total value of trade loaded in Québec were exported to markets minimally served from the other ports studied.[3]

7.1.2 Saint John

Saint John, in spite of handling a wider range of commodities than Québec, can be described as a semi-specialized port.

Two-thirds of the total value of cargo loaded in this port are generated by three industrial sectors (Table 7.1) more or less equally important:

- forestry, chiefly pulp and paper and paperboard;
- transportation equipment; and
- mining and mining products, chiefly nonferrous metals and nonmetallic minerals.

Saint John is the main Eastern Canadian port handling forest products and transportation equipment.

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[2] Generally speaking, the port of Québec does not dispatch these products to Britain, Belgium, France, West Germany, Italy, Sweden or Switzerland; these countries are served mainly from of Montréal and Halifax.

[3] A detailed description of export markets (country/commodity) served by each of the ports is given in a booklet of facts available on request.

Foods and other end products also represent significant trade for Saint John. The monetary value of these two groups compares well with the values observed for Halifax and Montréal. On the other hand, the majority of the goods loaded in Saint John go to different markets than do the export commodities handled by Montréal and Halifax. As indicated earlier, Saint John serves mainly Asia and Oceania, which are also served chiefly by that port.

It is easy to see, from a comparison of Table 7.2 and Table 6.3 (in the preceding chapter), that Saint John's share of meat and meat preparations (66%), textile and related fibres (49%) and iron and steel products (34%) exported from the four ports is an important part of Canadian trade to Asia and Oceania. Of the other general cargo handled at this port, most of the cereals and vegetables go to Central America and the Caribbean, while two-thirds of its sugar is dispatched to Eastern Europe; the other third goes mainly to Central America and the Caribbean. Eighty-three percent of the motor vehicles handled by Saint John--which has a 54% share of all these exports--are shipped to South America, while 14% go to Australia.

Of the general commodities handled by Saint John, only forest products go to Western Europe in significant quantities. Western Europe absorbed 56% of the total value of forest products loaded in Saint John in 1981, compared with 24% going to Asian countries. Not many other goods reach Western Europe from Saint John in any substantial quantities. Forest products represent 75% of the $195 million in goods that Saint John exports to Western Europe.

To summarize, we can make four observations about Saint John in 1981:

a) Exports to Asia and Oceania: trade route generating a large part of the traffic in crude and fabricated materials and the destination of almost 80% by value of all end products loaded in Saint John (Asia 35% and Oceania 43%);

b) Forest products: the bulk of trade to Western Europe; one of the few categories of general cargo with a diversified export market shipped from this port;

c) Service to Central America and the Caribbean: a large proportion of all foods handled by Saint John go to these countries;

d) Concentration of exports of motor vehicles: 71% exported to Venezuela, 14% to Australia (1981).

7.1.3 Halifax

Unlike the other ports, no single class of commodities dominates traffic from Halifax. Port activity in Halifax centres around six product categories (Table 7.1 - Nos 1,3,7,9,12 and 14) of moderate importance. Each category represents between seven and ten percent of the total trade of the port, except that transportation equipment has a 15% share of this trade.[4]

The lack of predominance of one class of products is attributable mainly to a high proportion of containers handled by this port, viz. 76% in 1981.[5] Once containerized merchandise has been identified, the composition of the overall trade based on containers shows a diversity of products handled. This situation seems to prevail in Halifax.

A comparison of each commodity handled by Halifax and by the other three ports (Table 7.2) reveals that certain products are well represented, if not concentrated, in Halifax. This is true particularly for the foods group: 89% of fruit and 56% of fish cargos were dispatched from Halifax in 1981.

The concentration of fruit in Halifax can be explained: it is perishable and demand for the specialized services required is seasonal. Fruit has to be loaded into refrigerated containers on board specially adapted vessels.

Another problem with refrigerated units is that the North Atlantic market is not in balance. There are more full outbound containers than inbound. Table 6.3 (previous chapter) shows that Western Europe absorbs 93% of Canadian fruit exported from the ports studied. In addition to the problem of redeploying and returning refrigerated containers, there is a slack period for fruit between May and August.[6]

It is advantageous, therefore, to have these special shipping services concentrated in a small number of ports. The

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[4] Motor vehicles and parts constitute 80% of the total value of transportation equipment exported from Halifax.

[5] This containerization rate is derived from Table 5.1, in Chapter 5.

high proportion of fish cargos handled by Halifax seems to favour centralization of fruit cargos there.[7] Fish exports also require refrigerated shipment. Concentration of perishable goods at the same location encourages better use of a given supply of regrigerated containers.[8] We have noted (Table 6.3) that Western Europe is the main export market for perishable goods. It would seem that these considerations also apply to shipments of crude materials, either animal or vegetable, from Halifax.

In short, we can say that the major attribute of Halifax is its special facilities for handling containers.

This port has not developed or maintained a special service based on a particular type of merchandise, nor on a preferred export market. Rather, it has concentrated on the developments in container cargo.

The second feature of Halifax is the general nature of the shipping services offered from this the port. In most cases these services are integrated into the continental shipping routes, i.e. routes where American and Canadian ports are linked for overseas service. In Canada, Halifax's location, in relation to the ports of New York and Baltimore, among others, gives it a relative advantage, over the other ports studied.

Because of these two dominant characteristics of Halifax, its overseas general cargo traffic is closely tied to two main container shipping routes: the North Atlantic and the Pacific. In this way Halifax obtains a good share of the market for exports to Australia, New Zealand and some Central American and Caribbean countries. Unlike the other three ports studied, however, no country or country bloc receives a significant share of the trade loaded in Halifax. Only Britain gets more than 10% of the exports dispatched from this port, and even this was only 16.7% in 1981. Nevertheless, as stated in the previous chapter, the Western European countries, taken as a whole, are by far the main export market served from Halifax.

7.1.4 Montréal

Overall, Montréal is the major general cargo port in

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[6] Agriculture Canada (1981), Containerized Transport of Perishable Foods in the Eighties, pp 23-28.

[7] The CN refrigerated container terminals in Montréal are not appropriately equipped. Agriculture Canada (1981), op. cit., p 33.

Eastern Canada. Montréal's share of the value of shipments dispatched from the four ports studied was 44% in 1981.

A first examination of the composition of this port's trade (Table 7.1) shows that, like Halifax, it handles a variety of commodities. Nevertheless, three classes stand out from the others.

Shipments of nonferrous metals; chemical and related products; ore concentrates and scrap amount to over $1.5 billion, or 53% of the total value of general cargo handled in Montréal.[9] This diverse cargo shipped from Montréal is distinguished by a high level of containerization.[10] Yet, unlike Québec and Saint John, traffic in Montréal is not so dependent on the principal components of its trade.

If we were to disregard the three major classes listed above, the role of Montréal would not be reduced as much as the roles of Québec and Saint John would be were we to take such action with them. Moreover, by ignoring them, we find that the port activities of Montréal in the other components of its trade are similar to those of Halifax. In fact, Montréal and Halifax are Canada's two main container ports.

For most of its products, however, Montréal attracts a greater flow of commodities than does Halifax (Table 7.2). There are at least two main factors: 1) a greater number of shipping companies offers conventional services[11] from Montréal and 2) the location of Montréal makes it a) a port zone in the interior of the North American continent and b) a major inland marshalling point for most of the commodities shipped overseas.[12]

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[8] In 1981 a refrigerated container cost between $30 000 and $35 000, while a conventional 40-foot container cost only $3 000 to $5 000.

[9] Appendix B gives a complete list of the dry and liquid bulk products excluded from the study.

[10] A special tabulation provided by the port of Montréal's computer services indicates that in 1981 70% of the total nonbulk tonnage of these three commodity categories was containerized. Conventional shipments represented 27% of the tonnage and roll on-roll off cargo the remaining 3%. This high containerization factor for the three categories translates into a 40% share by weight of all containerized exports.

[11] I.e. services other than fully containerized or roll on-roll off services (see Appendix F).

The previous chapter showed that Montréal is the main loading port for exports to Western Europe, especially Britain. Western European markets, it will be recalled, account for 53% of the total value of seaborne exports passing through Eastern Canadian ports. In particular, these markets absorbed approximately 80% of crude materials, and about 75% of fabricated materials loaded in Montréal in 1981.

As to the greater importance of general merchandise in the fourth major commodity group, especially industrial machinery and material handling equipment, this tends to reflect the importance of the cargos bound for African countries, certain countries in South America and Asia (other than Japan and China). These countries are major markets for these commodities; most shipments are dispatched via Montréal[13], and a few via Halifax.

To sum up, Montréal activity is determined by the dual role the port has in the overseas distribution of Canadian trade. First, like Halifax, Montréal is a major container port, serving most overseas export markets. Second, Montréal's port facilities are also adapted to handle conventional loads; this makes it a major port for non-containerized general cargo. This cannot be said for Halifax; Saint John, however, also has this last characteristic.[14]

7.2 The Western European Market

Because of its importance to Halifax and Montréal, we have presented the Western European market in more detail. The eight principal countries have been identified and particular attention has been paid to the roles of Halifax and Montréal.

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[12] A study by the Canadian Maritime Transportation Centre reveals that the Montréal metropolitan area was the marshalling point for 44% of all overseas-bound containers (expressed as TEUs) handled by the port of Halifax in 1978. The Province of Quebec was the region of first origin of containerized cargo loaded in Halifax in only 32% of the cases. (The Province of Quebec was the marshalling point in 49% of the cases). CMTC (1980), Tables 4A and 6A.

[13] Except for motor vehicles, which are exported via Saint John.

[14] Nevertheless, as noted previously, the range of countries served from this port is more limited than it is in the case of Montréal. That is largely why the value of crude materials loaded in Montréal is three times higher than it is in Saint John and the value of fabricated materials twice as high.

Table 7.3 shows Canadian exports to those Western European countries from the four ports studied, by country of final destination. Port share is given for each individual country, as is the relative importance of each country in the port's trade. Tables 7.4 and 7.5, for Halifax and Montréal, identify the main commodities exported to Western Europe with the major final destinations.

7.2.1 Overview

Table 7.3 clearly indicates the high proportion of exports to Western Europe. Britain, France, West Germany, the Netherlands and Belgium comprise 73% of this large market, or 39% of the total value of Canadian exports loaded in the four ports in 1981.

Montréal and Halifax are the dominant ports for exports to these countries. As shown in the first part of Table 7.3, Québec and Saint John play a significant role only in relation to the Netherlands and Italy. In addition, Québec, largely because of exports of ore concentrates and scrap, handles 51% by value of all Canadian general cargo trade destined for Western European countries other than those listed in Table 7.3. In fact, cargos leaving both Québec and Saint John to Western Europe comprise mostly crude and fabricated materials; only a limited number of end products is shipped from these ports. We can conclude from Tables 7.4 and 7.5, that Québec and Saint John have a 43% share of exports of crude materials and a 22% share of the fabricated materials market, but a share of less than 2% for each of the other three major commodity groups.

7.2.2 Roles of Halifax and Montréal

While Table 7.3 indicates that Montréal has a higher share of the Western European market, Tables 7.4 and 7.5 show that the situation varies according to the commodity.

Ocean shipping companies operating out of Halifax handled most of the food exports, particularly those destined for countries other than Britain. In addition, over a third of exports of machinery and transportation equipment and other end products are loaded in Halifax, as are 14% of crude materials and 18% of fabricated materials.

In final destinations, we can note that, except in the case of crude and fabricated materials, Halifax plays an important role in the distribution of trade to West Germany, France and Belgium. Even Britain, in spite of service mainly out of Montréal, is an important market for Halifax.

Table 7.3

CANADIAN EXPORTS TO WESTERN EUROPE
GENERAL CARGO
1981

Country of Final Destination	Seaport of Exit: Québec	Montréal	Halifax	Saint John	Total Value ($ million)	
A. Percentage Share of Market*						
Britain	3.1	69.7	21.9	5.3	1 100.3	(100.0)
Belgium	1.0	60.5	34.6	3.9	298.9	(100.0)
France	0.7	61.8	29.1	8.4	457.4	(100.0)
West Germany	5.4	50.7	31.7	12.2	419.7	(100.0)
Italy	4.8	27.3	29.5	38.4	144.0	(100.0)
Netherlands	28.2	52.6	10.7	8.5	312.8	(100.0)
Sweden	N/A	67.9	31.4	0.7	127.2	(100.0)
Switzerland	N/A	73.3	24.8	1.9	31.0	(100.0)
Other	51.1	27.5	18.6	2.8	658.3	(100.0)
Total	13.9	54.6	24.2	7.4	3 555.7	(100.0)
B. Relative Importance of Country in Percentage Terms*						
Britain	4.6	26.4	16.7	3.7	16.5	(30.9)
Belgium	0.4	6.2	7.1	0.7	4.5	(8.4)
France	0.4	9.7	9.2	2.5	6.9	(12.9)
West Germany	3.1	7.3	9.2	3.3	6.3	(11.8)
Italy	0.9	1.4	2.9	3.5	2.2	(4.1)
Netherlands	11.9	5.6	2.3	1.7	4.7	(8.8)
Sweden	-	3.0	2.7	0.1	1.9	(3.6)
Switzerland	-	0.8	0.5	N/A	0.5	(0.9)
Other	45.6	6.3	8.5	1.2	9.9	(18.5)
Total	66.9	66.7	59.1	16.7	53.4	(100.0)

* Calculated on the basis of monetary values.

Source: Canadian Transport Commission, Transport Industries Analysis.

Table 7.4

MONTRÉAL'S SHARE OF THE MARKET
BY PRODUCT AND WESTERN EUROPEAN COUNTRY OF DESTINATION*
($ million)
1981

MAIN COMMODITIES				MAIN COUNTRIES		
FOODSTUFFS:		Total Value		191.7	(45%)	
(03)	Fish	67.9	(40%)		Britain	126.1 (59%)
(09)	Vegetables	37.9	(63%)		West Germany	12.8 (21%)
(18)	Tobacco	37.1	(45%)		France	11.6 (33%)
(05)	Dairy products	16.7	(65%)			
CRUDE MATERIALS:		Total Value		379.3	(43%)	
(25)	Ore concentrates	279.9	(40%)		Britain	212.5 (80%)
(27)	Crude nonmetallic minerals	78.8	(62%)		Belgium	45.7 (74%)
					Netherlands	20.1 (90%)
FABRICATED MATERIALS:		Total Value		1 041.1	(60%)	
(45)	Nonferrous metals	435.0	(81%)		Britain	319.6 (68%)
(40)	Chemical products	375.6	(49%)		France	222.8 (65%)
(36)	Textile fabricated materials	45.9	(66%)		West Germany	142.5 (61%)
(34)	Pulp	42.2	(19%)		Netherlands	109.6 (46%)
(33)	Wood fabricated materials	31.7	(29%)		Belgium	101.0 (60%)
MACHINERY AND TRANSPORT:		Total Value		191.0	(64%)	
(52)	Special industry machinery	66.0	(62%)		Britain	46.5 (75%)
(58)	Road motor vehicles	42.0	(79%)		Sweden	30.2 (80%)
(63)	Communication equipment	31.5	(56%)		West Germany	21.5 (50%)
(50)	General purpose industrial machinery	19.1	(63%)		Other	42.4 (64%)
(51)	Material handling equipment	14.7	(78%)			
OTHER END PRODUCTS:		Total Value		165.0	(65%)	
	See Appendix H				Britain	65.6 (71%)
					West Germany	20.8 (56%)
					Sweden	14.6 (70%)
					Belgium	13.6 (60%)
					Switzerland	13.0 (78%)
					Other W. Europe	19.3 (64%)

* For example, 45% by value of food exports were loaded in Montréal, 59% of food exports to Britain were dispatched from Montréal and 40% of fish exports to Western Europe were loaded in Montréal.

Source: Statistics Canada, External Trade Division.

Table 7.5

HALIFAX'S SHARE OF THE MARKET
BY PRODUCT AND WESTERN EUROPEAN COUNTRY OF DESTINATION*
($ million)
1981

MAIN COMMODITIES				MAIN COUNTRIES		
FOODSTUFFS:		Total Value		231.9	(54%)	
(03)	Fish	102.3	(60%)		Britain	86.2 (41%)
(18)	Tobacco	45.0	(55%)		West Germany	47.3 (79%)
(07)	Fruit	27.4	(92%)		France	23.2 (66%)
(09)	Vegetables	18.4	(31%)		Belgium	14.9 (76%)
					Netherlands	13.3 (64%)
CRUDE MATERIALS:		Total Value		127.3	(14%)	
(25)	Ore concentrates	90.8	(13%)		Britain	53.8 (20%)
(27)	Nonmetallic minerals	17.1	(13%)		Other	36.5 (9%)
FABRICATED MATERIALS:		Total Value		312.6	(18%)	
(40)	Chemical products	115.4	(20%)		France	78.6 (23%)
(45)	Nonferrous metals	74.4	(14%)		Britain	60.5 (13%)
(33)	Wood fabricated materials	48.8	(44%)		Belgium	55.1 (33%)
(36)	Textile fabricated materials	22.8	(33%)		West Germany	35.2 (15%)
					Italy	20.6 (25%)
MACHINERY AND TRANSPORT:		Total Value		100.0	(34%)	
(52)	Special industry machinery	39.3	(37%)		West Germany	21.2 (50%)
(50)	General Purpose Industrial Machinery	10.4	(34%)		Britain	15.2 (25%)
(63)	Communication equipment	24.1	(43%)		France	15.2 (50%)
(58)	Road motor vehicles	10.7	(20%)		Belgium	12.1 (45%)
					Italy	8.9 (62%)
OTHER END PRODUCTS:		Total Value		86.3	(34%)	
	See Appendix H				Britain	26.3 (29%)
					West Germany	16.3 (44%)
					France	13.1 (52%)
					Belgium	8.2 (38%)
					Sweden	5.6 (30%)

* For example, 54% by value of food exports were loaded in Halifax, 41% of food exports to Britain were dispatched from Halifax and 60% of fish exports to Western Europe were loaded in Halifax.

Source: Statistics Canada, External Trade Division.

Table 7.4 brings out two aspects of the role of Montréal that set it apart from Halifax.

First, Canadian exports to Britain are concentrated in Montréal. This dominance in shipments to Britain exists equally in individual commodity groups as in overall exports. In particular, almost two thirds of all Western Europe-bound food exports loaded in Montréal are absorbed by the Britain. Montréal's role in the distribution of these goods to other Western European countries is a minor one, however, since Halifax handles most of that trade.

Second, crude and fabricated materials form a large proportion of Western Europe-bound trade loaded in Montreal. Three categories of these materials predominate: ore concentrates (No. 25) alone account for 75% of trade in crude materials; and non-ferrous metals (No. 45) and chemical products (No. 40) together represent 80% of exports of fabricated materials.

Concerning exports of end products (groups IV and V), Tables 7.4 and 7.5 reveal that:

- Belgium, France and West Germany are served more or less equally from Halifax and Montréal;
- Britain, the Netherlands, Sweden and Switzerland are served mainly from Montréal; and
- Italy is served chiefly out of Saint John and Halifax.

7.3 Analytical Review

Examination of the final destination and composition of Canadian trade loaded in each of the ports studied has revealed that certain commodity categories are concentrated in a particular port and that there seems to be a general segmentation of export markets. The distinct role of each port seems to be based on a combination of two general factors governing trade handled in a port, to which references have been made in Chapter 5:

- the trend by international shipping lines towards greater concentration and reorganization of their services; and
- the composition, magnitude and overall nature of general cargo exported to the various markets affects the establishment of the different shipping routes.

7.3.1 Market Segmentation

This section seeks to explain the segmentation of Canadian export markets served by the four ports. Eight maps have been prepared for this purpose (Figures 7.1 to 7.4). Each port is described in terms of the overseas distribution of its trade, and its share of the Canadian export markets concerned.

For example, Figure 7.1 shows that, even though Eastern Europe absorbs only 2.6% of all trade handled by Saint John, this port's share of the Eastern European market was almost 20% in 1981. A comparison of the maps showing the market shares of the various ports is particularly revealing on the service orientations of the shipping companies operating from the ports. We can make the following five observations.

First, rationalization and concentration of shipping services, brought about by traffic density and the development of containerization, is shown by a 70% concentration of traffic bound for Britain in Montréal. Montréal and Halifax handle around 50% and 25% of all Canadian exports to Western Europe, excluding Britain.

Second, consolidation in the port of Saint John of trade destined for Asia (62%) and Oceania (71%) could also be attributed to the shipping services offered. On the one hand, since size of vessels usually increases with the length of trade routes, and since increased size cuts operating costs, we can state as a corollary that the operation of large vessels can take economic advantage of consolidation of cargos at a limited number of ports. Moreover, shipping services to these countries correspond with a continental route whose itinerary serves both the Canadian and the American markets. Carriers on these routes seek a balance between handling costs and hauling costs, and enough traffic volume to effect economies of scale. They try to pick up a full cargo by calling at only a few ports.[15] The consolidation of cargo in Saint John in preference to Halifax is due in part to the large amount of fabricated materials dispatched to Asia and Oceania.

Third, ocean shipping companies operating from Halifax have a marked presence on, but not dominance of, the two main shipping routes for Canadian trade, i.e. the North Atlantic and Pacific (especially South Pacific) routes, compared with their lesser presence on the South Atlantic routes (serving South

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[15] See, inter alia, J.O. Jansson and D. Shneerson (1982), J.E. Davies (1982) and S. Gilman and G.F. Williams (1976).

Figure 7.1
PORT OF ST. JOHN,
OVERSEAS DESTINATION OF TRAFFIC IN 1981

PORT OF ST. JOHN: MARKET SHARES OF THE FOUR PORTS TRADE SHIPPED TO INTERNATIONAL MARKETS IN 1981

Source: Canadian Transport Commission, Transport Industries Analysis

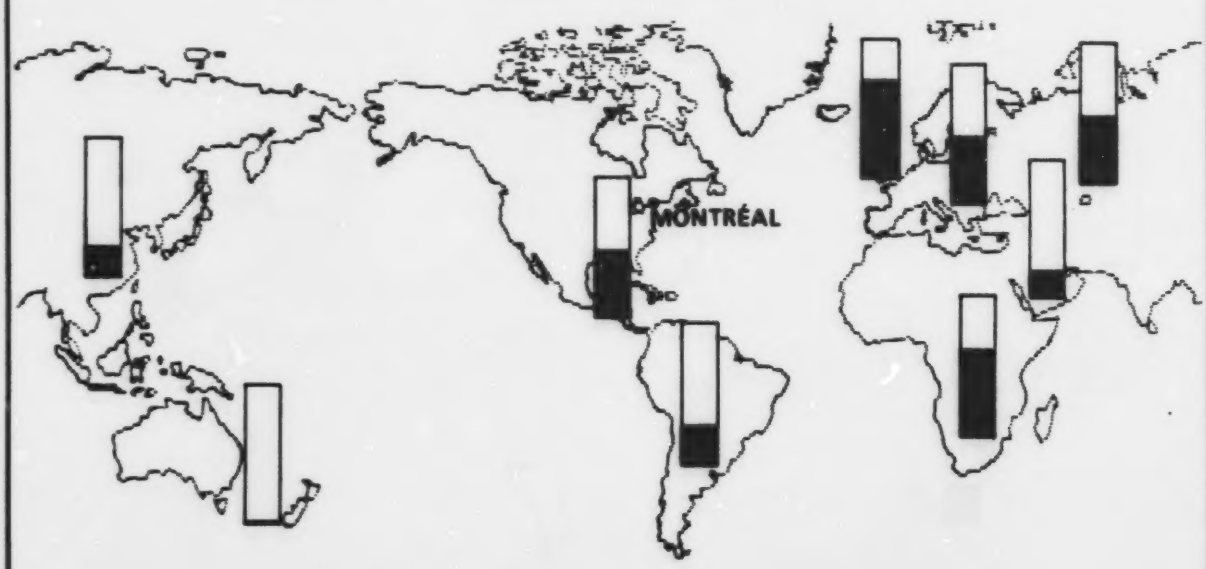
Figure 7.2
PORT OF HALIFAX,
OVERSEAS DESTINATION OF TRAFFIC IN 1981

PORT OF HALIFAX: MARKET SHARES OF THE FOUR PORTS TRADE SHIPPED TO INTERNATIONAL MARKETS IN 1981

Source: Canadian Transport Commission, Transport Industries Analysis

Figure 7.3
PORT OF MONTRÉAL,
OVERSEAS DESTINATION OF TRAFFIC IN 1981

PORT OF MONTRÉAL: MARKET SHARES OF THE FOUR PORTS TRADE SHIPPED TO INTERNATIONAL MARKETS IN 1981



Source: Canadian Transport Commission, Transport Industries Analysis

Figure 7.4
PORT OF QUÉBEC,
OVERSEAS DESTINATION OF TRAFFIC IN 1981

PORT OF QUÉBEC: MARKET SHARES OF THE FOUR PORTS TRADE SHIPPED TO INTERNATIONAL MARKETS IN 1981

Source: Canadian Transport Commission, Transport Industries Analysis

America and Africa). The Middle East market is somewhat special owing to the large exports of motor vehicles. Without these exports, Halifax's share of the Middle East market would be only to 15%.[16]

This distinctive structure of Halifax's share of the markets is directly related to the fact that the overwhelming majority of the shipping companies operating out of this port provides continental shipping services. These are usually specialized services the establishment and operation of which depend largely on the considerable flow of traffic passing through U.S. east coast ports. The American ports most frequently included in these routes are New York, Baltimore and Norfolk. Halifax's geographical location seems to be the determining factor for carriers choosing this port over Montréal and Saint John.

Fourth, most of the shipping services to South America and Africa operate out of Montréal and Saint John. This is due mainly to the type of trade exported to these blocs, dominated as it is by goods that usually require conventional loading, so that most shipping services are little container oriented. Another explanation would be the type of goods Canada imports from these country blocs, over two thirds of them being crude materials[17], mostly nonbulk and non-containerized.

Finally, Québec generally has small shares of the markets. Its few shares of some importance, linked with certain countries, usually relate to specific commodity categories. This overall situation seems to be partly attributable to the fact that it costs less to transport general cargo overland than to have a ship leaving Montréal make a regular call at Québec. The policy generally pursued by shipping companies is to include Québec in their itinerary as a call that must offer a minimum load (see Appendix F).

7.3.2 Conclusion

These five general points present the background to the structure of international ocean shipping of general cargo in Eastern Canada. Although this study would seem to suggest that the relations between the four ports are complementary rather

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[16] The corresponding shares of Québec, Montréal and Saint John would be reduced to 29%, 31% and 25%.

[17] Statistics Canada, Imports - Merchandise Trade, 1981, Catalogue 65-203, Table 1, pp 1-7.

than competitive, we should not conclude that a given port does not compete with other ports in attracting maximum traffic. Rather, activity in each port seems to relate to different segments of the demand for port services by ocean shipping companies.

The 1981 data show that the four ports studied play a major role in the effectiveness with which the Canadian port system as a whole is co-ordinated with the activities of the ocean shipping sector. Montréal emerges as the Canadian port for ocean shipping companies which offer distinctive shipping services, both conventional and container, where services and itineraries take advantage of the location of this port in the interior of the North American continent. Halifax and Saint John attract shipping companies whose services are mainly based on continental shipping services. Thus, these ports integrate the Eastern Canadian port system into the new international seaborne trade distribution structure which has evolved in international routes. It seems that the dual capabilities of the port facilities at Saint John, as opposed to those in Halifax, which are based on containers, favor Saint John as a port of call for continental services on the South Atlantic and Pacific routes.[18]

Port activity and ocean shipping services in Eastern Canada as they relate to general cargo are influenced both by the relatively small amount of Canadian seaborne trade and its slow rate of growth[19], and by technological developments in overland and water transport. The result is that ocean shipping companies tend to establish itineraries involving a limited number of ports and to aim for maximum productivity and economies of scale derived from technological developments. Thus they can obtain

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[18] As illustrated in Figure 7.2, carriers registered in Halifax also operate a well established service to the Pacific markets. As a large proportion of exports to the Pacific is made up of crude and fabricated materials, however, it is expedient for services to be concentrated in Saint John. Shipping services to South America, too, are nonspecialized container services, which operate mainly out of Saint John. Of the six liner companies registered in Saint John that offer year-round services to these markets, three operate a regular, and three a casual, joint Canadian/United States service.

[19] At the seminar on Canadian Perspectives on the UNCTAD Code of Conduct for Liner Conferences, held in Montréal in May 1982, a growth rate of 0.5% was suggested for Canadian international liner traffic, and 4% for all ocean shipping activities, between 1978 and 1990.

optimal load factors compatible with the economic viability of the equipment and the overall system of services.[20]

To sum up, port activity in Eastern Canada tends to segment according to the type of merchandise; cargo unit destined to the countries served; and shipping service structure and type of service (separate route vs. continental route) offered by the various carriers. It would seem, then, at least in the context of the ports studied, that competition between ports to attract a maximum flow of traffic occurs largely at the level of the ocean shipping companies operating from the various ports according to different market policies and practices.

Competition is reduced, though, as J.M. Verhoeff (1977) suggests, by large shipping service structures such as consortia, decentralized commercial groupings and liner conferences, and by integration of the various links in the trade distribution chain through multimodal transport. As Verhoeff explains, however, the level at which international transport is organized in this way "... is perhaps the level at which competition shows itself in the purest form, although even here gentlemen's agreements (may) restrict competition artificially".[21]

On the basis of these considerations and in the face of structural change in a port's activity within a large port area, the various port authorities should realize that technological developments can reshape international ocean transport. After all, without putting aside priorities in regional development, if one port's progress leads to regression or problems of underactivity in another port, the national situation remains unchanged. What one gains the other loses. On the other hand, at a continental, or international, level, such shifts can result in a better competitive position of the national port network in relation to foreign ports located on the same seabord.

Consequently, it is essential that local and regional port authorities co-ordinate their activities either implicitly or explicitly and that they strive to:

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[20] See in particular the paper by S. Gilman (1982), Containerships in their Transport Networks.

[21] J.M. Verhoeff, Seaport Competition: An Analysis of its Nature, International Journal of Transport Economics, 1977, Vol IV, No. 3, p 274.

- adapt their ports to technological changes;
- maintain the competitiveness of conditions of access and operations;
- monitor traffic structure and changes;
- follow developments in ocean transportation of the various commodities, not only on the individual national routes but also on the continental/international routes; and
- strengthen the commercial structure of their ports.

Chapter 8

INLAND FLOWS OF GENERAL CARGO FOR EXPORT

This chapter studies the inland regions generating Canadian demand for international ocean shipping services, and, hence, port services.

First, it is useful to determine the influence of each region. The relative importance of each inland market is described according to total flow generated to a given port. A more specific description of the domestic movement of the merchandise shows trends in the flows to the ports according to the five groups of general cargo. In this way a clearer idea emerges of the relation between an inland region and a port, and the regions' economic activities directed to overseas markets.

The hinterlands can also be studied from the point of view of traffic flows (defined by domestic market, type of commodity and port). Two situations are shown:

a) cases where, for a given region, certain merchandise shows a dominant flow trend towards a particular port, and

b) cases where, for a given port, certain merchandise originates predominantly from the same region.

8.1 Description of Hinterland Patterns

8.1.1 General Description

Tables 8.1 and 8.2 give the percentage distribution of total flows of commodities exported via the ports by inland region. From the tables we can make the following four observations:

First, it is useful to compare the role of each province or group of provinces (Table 8.1, last column) with the role of each port (Table 8.2, last line). With only 13% of the total value of exports originating from the Maritimes but with 45% of exports being loaded in Halifax and Saint John, the inland flows of general cargo must be characterised by tendencies to use various ports.

Second, the hinterlands of Halifax and Saint John, on a first examination, seem to be similar: Ontario is the main source of their traffic (Table 8.1). These ports differ in their roles, however (Table 8.2). Saint John absorbs most of the

Table 8.1

LOCAL AREAS OF LOADING FOR OVERSEAS EXPORT
OF GENERAL CARGO BY PORT STUDIED
1981
(in percentages)

Local Areas of Loading	Port of Exit				
	Saint John	Halifax	Montréal	Québec	Total
Atlantic	33.0	22.9	0.3	N/A	12.9
Quebec	22.5	21.2	48.9	89.5	41.1
Ontario	42.0	52.1	44.7	10.3	41.9
Prairies	2.4	3.0	3.8	0.2	2.9
Pacific	0.2	0.7	2.3	0.1	1.2
Total	100.0	100.0	100.0	100.0	100.0

Source: Statistics Canada, External Trade Division.

Table 8.2

PORTS OF EXIT FOR OVERSEAS EXPORT
OF GENERAL CARGO BY LOCAL AREA OF LOADING
1981
(in percentages)

Local Areas of Loading	Port of Exit				
	Saint John	Halifax	Montréal	Québec	Total
Atlantic	60.2	38.8	1.0	N/A	100
Quebec	12.8	11.2	51.9	24.1	100
Ontario	23.6	27.1	46.6	2.7	100
Prairies	19.6	22.6	57.5	0.7	100
Pacific	3.6	13.4	82.2	0.7	100
Canada	23.5	21.8	43.7	11.1	100

Source: Statistics Canada, External Trade Division.

traffic from the Maritimes, while it receives a small part of the commodities originating in the Pacific area. Halifax, on the other hand, takes a significant share of each inland market, without dominating any.

Third, Ontario and Quebec are the principal hinterlands of Montréal. These two regions generated over 90% of all Canadian trade loaded in this port in 1981. Nevertheless, Montreal is a magnet for the whole of Canada and the farther away from Montréal ones goes, the more the traffic seems to gravitate towards this port vis-à-vis Halifax and Saint John.

Fourth, the provincial nature of Québec's activities sets this port apart from the others.

8.1.2 The Major Groups of General Cargo

Given the segmentation of port activity according to commodities handled, and the varying economic structures of the provinces or province blocs, there must also be variation in the configuration of the ports' hinterlands. Tables 8.3 and 8.4 show the relative importance of the inland regions to each port, according to the major commodity groups.

- Québec

Québec is the only port that does not present significant changes in its hinterland when one considers overall and specific patterns by major commodity group. This similarity of hinterlands in the case of the various merchandise groups reinforces this port's provincial role. A more significant extension of the hinterland into Ontario is found only in crude and fabricated materials. The 16.4% (Table 8.3) for the fourth group of commodities should not be regarded as important since it represents a monetary value of only $1 million (Table 8.4).

- Montréal

For the five commodity groups collectively, Ontario and Quebec are the main suppliers of the port of Montréal. Nevertheless, the Pacific is an important area in traffic of foods to the port.

Table 8.4 (last column) shows that the structure of merchandise shipped from the Pacific region to the Canadian eastern ports is dominated by food products. As such it is a specialized hinterland extension for Montréal, which receives much more of this traffic than do the three other ports, The Prairies, on the other hand, offering a more diversified and

Table 8.3

HINTERLANDS OF PORTS STUDIED
BY MAJOR GROUP OF GENERAL CARGO
1981
(in percentages)

Commodity Group and Local Area of Loading	Seaport of Exit				
	Saint John	Halifax	Montréal	Québec	Total
Foods, feed, tobacco and beverages					
Atlantic	66.3	57.8	0.8	-	38.5
Quebec	12.5	14.2	41.3	99.8	26.5
Ontario	19.6	21.5	34.5	0.2	24.4
Prairies	1.5	4.4	6.3	-	4.1
Pacific	0.1	2.1	17.1	-	6.5
Total	100.0	100.0	100.0	100.0	100.0
Crude materials, inedible					
Atlantic	8.6	16.3	0.2	-	3.8
Quebec	68.2	27.6	47.6	89.6	60.1
Ontario	23.0	53.2	48.4	10.3	34.0
Prairies	0.1	2.4	2.5	-	1.4
Pacific	0.1	0.5	1.3	0.1	0.7
Total	100.0	100.0	100.0	100.0	100.0
Fabricated materials, inedible					
Atlantic	47.6	11.4	0.4	-	13.3
Quebec	25.4	28.0	49.4	85.6	44.0
Ontario	22.1	56.8	46.0	14.0	38.7
Prairies	4.6	3.7	4.1	0.3	3.8
Pacific	0.3	0.1	0.1	0.1	0.2
Total	100.0	100.0	100.0	100.0	100.0
Industrial and agricultural machinery and transportation and communication equipment					
Atlantic	3.8	7.2	0.2	-	3.3
Quebec	5.7	12.2	52.8	83.6	25.8
Ontario	90.2	79.5	43.1	16.4	69.0
Prairies	0.2	0.8	3.6	-	1.6
Pacific	0.1	0.3	0.3	-	0.3
Total	100.0	100.0	100.0	100.0	100.0
Other end products					
Atlantic	24.5	9.7	0.1	N/A	7.2
Quebec	24.6	33.5	50.5	99.0	45.6
Ontario	47.8	52.7	46.5	0.2	44.2
Prairies	2.8	3.7	2.4	0.8	2.6
Pacific	0.3	0.4	0.5	N/A	0.4
Total	100.0	100.0	100.0	100.0	100.0

Source: Statistics Canada, External Trade Division.

Table 8.4

DISTRIBUTION OF SEABORNE EXPORTS BY
MAJOR GROUP OF GENERAL CARGO AND LOCAL AREA OF LOADING
OVERSEAS TRADE - 1981
($ million)

Commodity Group and Local Area of Loading	Seaport of Exit				Total Value
	Saint John	Halifax	Montréal	Québec	
Foods, feed, tobacco and beverages					
Atlantic	150.4	217.7	2.6	-	370.7
Quebec	28.4	53.6	130.7	43.0	255.7
Ontario	44.5	80.8	109.0	0.1	234.4
Prairies	3.4	16.4	19.9	-	39.7
Pacific	0.2	7.8	54.1	-	62.1
Total	226.8	376.4	316.4	43.1	962.7
Crude materials, inedible					
Atlantic	13.5	30.1	0.7	-	44.3
Quebec	106.3	51.4	227.4	329.0	714.1
Ontario	35.8	98.9	231.3	38.0	404.0
Prairies	0.2	4.5	12.1	-	16.8
Pacific	0.1	1.0	6.7	0.4	8.2
Total	155.9	185.9	478.2	367.4	1 187.4
Fabricated materials, inedible					
Atlantic	307.9	48.6	4.7	-	361.2
Quebec	164.4	120.1	673.6	234.3	1 192.4
Ontario	142.3	242.5	627.7	38.0	1 050.5
Prairies	29.5	15.6	56.3	1.0	102.8
Pacific	1.7	0.4	1.8	0.2	4.1
Total	646.3	427.2	1 364.1	273.5	2 711.2
Industrial and agricultural machinery and transportation and communication equipment					
Atlantic	16.1	24.4	0.7	-	41.2
Quebec	24.1	41.1	248.0	5.1	318.3
Ontario	379.6	268.4	202.9	1.0	851.9
Prairies	0.7	2.7	16.7	-	20.1
Pacific	0.5	1.0	1.6	-	3.1
Total	421.1	337.6	469.9	6.1	1 234.7
Other end products					
Atlantic	28.6	12.1	0.3	N/A	41.0
Quebec	28.7	41.7	143.6	47.4	261.4
Ontario	55.7	65.6	132.0	0.1	253.4
Prairies	3.2	4.6	6.8	0.4	15.0
Pacific	0.3	0.5	1.4	N/A	2.2
Total	116.6	124.5	283.9	47.9	572.8

Source: Statistics Canada, External Trade Division.

larger market, transport their goods to Halifax as much as to Montréal.

- Atlantic ports

It is the Atlantic ports, particularly Saint John, whose hinterlands, determined on the basis of flows of commodity groups, are found to vary most from the general observations made earlier. In addition, without negating the overall similarity of the hinterlands of these two ports as revealed in Table 8.1, certain differences emerge according to commodity group (Table 8.3).

Saint John shows the greatest variation in hinterland configuration according to the type of commodity flow. While Ontario, mainly on account of its transportation equipment, supplies this port with most of its Group IV commodities, Quebec generates over two-thirds of its crude materials traffic, and the Maritimes themselves provide two thirds of its traffic in foods. The domestic markets for fabricated materials and other end products show greater dispersion. Except in the case of fabricated materials originating in the Prairies, Saint John's western hinterlands are not significant; it depends on the eastern provinces for most of its traffic.

The configuration of Halifax's hinterlands changes somewhat according to the major group of commodities considered. First, the role of the Maritimes relates mainly to foods. Most of the traffic from the western provinces is also in foods. Second, Ontario is the principal domestic market for Halifax, generating over 51% of its traffic, based on the four commodity groups. Third, Halifax has a hinterland in the Prairies, while its dependence on the Pacific is minimal.

- The four ports studied and Western Canada

We endeavoured to evaluate the importance of the 4.1% total traffic movements from Western Canada[1] to eastern ports in relation to the total traffic of general cargo passing through the Pacific ports.

The method used was to add, by major group of general cargo, the value of traffic loaded in each of the western ports (Appendix E) to the value of traffic originating in the West and loaded in the ports studied (Table 8.4), and to divide the result

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[1] I.e. 2.9% from the Prairies and 1.2% from the Pacific (Table 8.1).

into the value of traffic originating in the West and loaded in the ports studied. On the basis of this calculation we found that, of all general cargo originating in Western Canada and exported overseas by sea,

18% of foods
2.7% of inedible crude materials
3.4% of inedible fabricated materials
17% of miscellaneous machinery and transportation equipment
36% of other end products

were loaded in the ports studied.

These figures seem to show that the higher the value of the commodity, the greater the mobility in flow trends.

8.2 Analysis of the Hinterlands

The preceding section described what Grace L. Powell (1968) calls the "macrohinterlands" of the four ports studied. Such a description, even when given by commodity group, provides only a general picture of the inland movement of goods. A more adequate description of a port's hinterland requires a breakdown according to principal components, i.e. an analysis by main traffic flows. This kind of analysis can provide answers to four important questions:

- What are the roles of the various inland regions in relation to the cargo loaded in a port?
- What are the principal commodities a region dispatches to a port?
- What are the commodities per inland region on which the port is more dependent than it is on the region as a whole?
- What are the commodities per inland region whose flow trend towards a particular port is higher than the national flow trend?[2]

Two specific indices, the Index of Categorial Importance and the Flow Trend Index, have been established for the purposes of this analysis.

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[2] A booklet of results produced conjointly with this report gives the monetary value for main commodity flow per port and area of origin.

8.2.1 Calculation of the Index of Categorial Importance and the Flow Trend Index

Borrowed from C. Verlaque (1979), the Index of Categorial Importance (ICI) - "indice de gravité catégoriel" in French - is obtained by comparing each category of merchandise in a given region as a percentage of the total flow of the category through a given port with all merchandise from a given region as a percentage of the port's total export flow. Mathematically, this can be represented as

$$(1)\quad ICI = \frac{x_{ilp}/x_{ip}}{x_{lp}/x_{p}}$$

where

x_{ilp} = the flow of commodities (i) dispatched from the region (l) to the port of exit (p);

x_{ip} = the total flow of commodities (i) through the port (p) (total regions);

x_{lp} = the total flow of commodities from the region (l) to the port of exit (p) (total commodities);

x_{p} = the total flow of commodities through the port (p) (total regions and commodities).

Thus, the Index of Categorial Importance compares the role of a given region in the total flow of a given commodity category through a given port with the overall role of that region in the port's overall commodity flows. As defined in (1) above, this index can have a value between zero and infinity. The interpretation of this index is particularly interesting:

a) Value below 1: the port is less dependent on the commodity category than it is on the region as a whole;
b) Value of 1: the port's dependence on the commodity category coincides with its dependence on the region as a whole;
c) Value above 1: the port is more dependent on the commodity category than it is on the region as a whole.

Above-one indices for commodities in a specific region are a good means of identifying the principal commodities

originating in that region. Moreover, the numerical value of an index tells us how many times greater (or smaller if the value is below 1) a region's contribution per commodity category is than the interregional distribution of the relevant port's total traffic.

The second index, borrowed from J. Charlier (1979), is the Flow Trend Index (FTI), or "indice d'orientation des flux". This index relates regional commodities moving to each of the ports studied to average national flows to these ports. Mathematically this can be represented as:

$$(2)\ FTI = \frac{x_{ilp}/x_{il}}{x_{ip}/x_i}$$

where

x_{ilp} and x_{ip} are as defined in (1);

x_{il} = the flow of commodities (i) originating in the region (l);

x_i = the total flow of commodities (i) through the four ports as a whole.

As defined in (2) above, the Flow Trend Index can be seen as the ratio between the average regional trend for exporting a given commodity via a given port and the average national trend for exporting that commodity via that port.

Like the Index of Categorial Importance, the Flow Trend Index varies from zero to infinity. A value below 1 indicates a regional flow trend below the national average, while a value above 1 signifies a regional flow trend above the national average. Since this last index enables us to identify regional commodity flows and a given port's dependence on them, we can measure the extent of that port's hinterland. Thus, we can say that:

a) a port is the preferred port of an inland region when the Flow Trend Index for a large number of commodities is high, and

b) a port has a specialized hinterland in a particular region when a small number of commodities produce a high Flow Trend Index.

In short, the Flow Trend Index focuses on a region's commodities as favouring a particular port of exit, while the

Index of Categorial Importance indicates, for a given port, the commodities originating from a dominant or a non-dominant region. [3]

By way of example--the two indices will be further interpreted later--the flow of fish and marine animals (No. 03) between Ontario and the port of Saint John correspond to an FTI of 4.18[4] and an ICI of only 0.26.[5] The values of these two indices show that Ontario fish is exported mainly via Saint John but that these same exports are only a small proportion of all Canadian fish passing through that port.

Table 7.2 gives the ICI and FTI for the 28 principal commodity categories identified in the previous chapter and for the seven commodity classes of the fifth major group, other end products. Although the 28 categories selected out of the first four groups represent less than half of the possible 64, they account for 96% of the total trade value of those groups.[6]

8.2.2 Québec

Because of the provincial nature of its hinterland and because of the lack of diversity in its general commodity traffic (ten commodity categories together account for approximately 97% of the total value of its exports), no indices have been calculated for the port of Québec. Table 8.5 gives a clear

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[3] C. Verlaque (1979) and J. Charlier (1979) mention several authors who deal with hinterland patterns and have proposed similar or different indices. Regarding the two indices selected for this study, the ICI is used on the basis of statistics expressed in tonnes (hence "indice de gravité..." - i.e. weight) while the FTI was obtained from statistics expressed according to volume and value. As can be seen from Table 2 in Charlier's study, the interpretation of these indices and the information that can be gained from them are valid and noncontradictory, whether the unit of measure is volume or value.

[4] A regional flow trend more than four times higher than the national trend for this category.

[5] A contribution approximately four times (1/0.26) lower than Ontario's 42% overall share of Saint John's total traffic.

[6] The reader will recall that the Statistics Canada two-digit classification system distinguishes 96 categories of general commodities, which can be placed in 25 product classes or five broad groups of general commodities (see Appendix G).

Table 8.5

PORT OF QUÉBEC
MAIN EXPORTS OF GENERAL CARGO
BY LOCAL AREA OF LOADING
1981
($ million)

Commodities	Total Value	Local Area of Loading				
		Atlantic	Quebec	Ontario	Prairies	Pacific
I Foods, feed, beverages and tobacco						
(05) Dairy products	42.8	-	42.8	-	-	-
Group percentage	99.4					
II Crude materials, inedible						
(25) Ore concentrates	332.4	-	294.5	37.9	-	-
(27) Nonmetallic minerals	33.4	-	32.8	0.1	-	0.4
Total	365.8					
Group percentage	99.6					
III Fabricated materials, inedible						
(35) Paper and paperboard	97.9	-	94.7	3.3	-	-
(40) Chemical and related products	96.6	-	64.3	32.3	-	-
(33) Wood fabricated materials	57.9	-	57.7	-	-	0.2
Total	252.4					
Group percentage	92.3					
IV Industrial and agricultural machinery and transportation equipment						
(58) Road motor vehicles	2.7	-	2.7	N/A	-	-
(51) Material handling equipment	1.6	-	1.6	-	-	-
(52) Special industry machinery	0.9	-	0.3	0.6	-	-
Total	5.2					
Group percentage	84.5					
V Other end products						
(94) Miscellaneous end products	46.6	-	46.2	-	0.3	-
Total	46.6					
Group percentage	95.2					

Source: Statistics Canada, External Trade Division.

picture of this port's hinterland, however. Extensions beyond the province are found in the case of only two commodity categories: ore concentrates (No. 25) and chemical and related products (No. 40), both of which originate in Ontario. However, Québec is not a preferred port for these products of Ontario; they make up only 11% and 7% respectively of Ontario's exports in those categories.

8.2.3 Saint John

Figure 8.1 shows, by means of a histogram, the relative extension of Saint John's hinterland into the five inland regions as measured by the Flow Trend Indices.[7]

Table 8.6 gives three Flow Trend Index interpretations according to the values of the indices.

In 1981, 77% of general cargo originating in the Atlantic provinces flow towards Saint John in a trend that is higher than the national average; 45% of these even double the national average. This confirms the regional role of this port for the Maritimes.

About a third of the commodity flows to Saint John from Quebec show a trend similar to the national trend, while two-thirds have low flow trend indices. We could say that Saint John has a low degree of hinterland extension into Quebec despite the fact that a significant amount of Quebec's overseas trade passes through that port. Saint John has a pronounced influence on the Ontario market, however. Just over a third of Ontario's commodities show a strong flow trend towards Saint John, while less than 20% of the flows show trends that are below the national average. Thus, we can say Ontario is an important market for Saint John.

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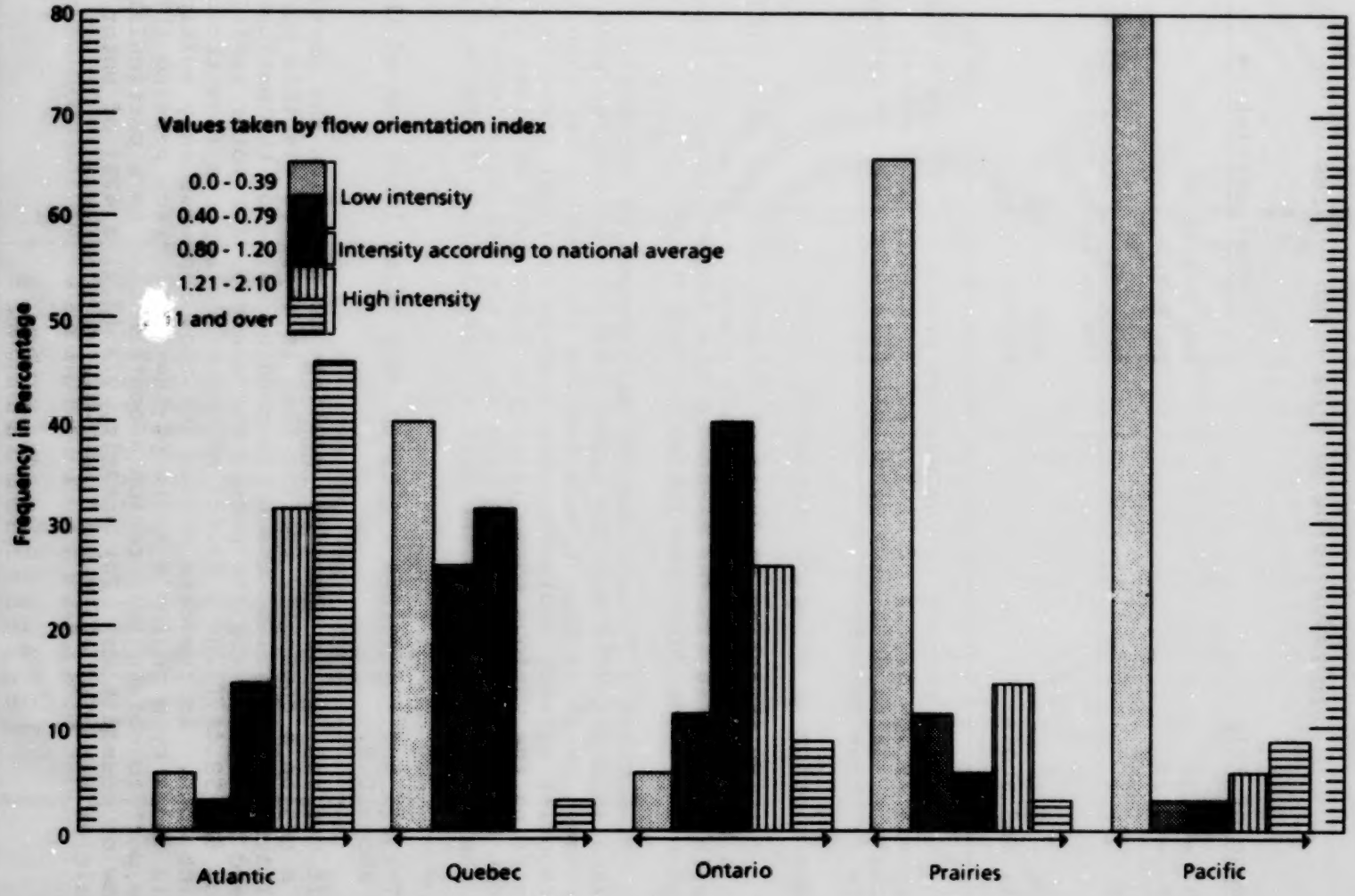
[7] The figure was prepared on the basis of the 28 categories of main commodities listed in Table 7.2 and the seven classes of other end products given in Table 7.1, for which the FTIs were calculated. These commodities represented 97% of all Canadian exports dispatched overseas from the port of Saint John in 1981.

Figure 8.1

INLAND PENETRATION INTENSITY OF THE PORT OF ST. JOHN, 1981



Source: Canadian Transport Commission, Transport Industries Analysis.

Table 8.6

INTERPRETATION OF FLOW TREND INDICES

Range of FTIs	Characteristics
0.0 - 0.39 0.4 - 0.79	Low degree of extension
0.8 - 1.2	Extension corresponding to the national average
1.21 - 2.1 2.11 and above	High degree of extension

With respect to the western provinces, Figure 8.1 shows a generally low degree of hinterland extension into western markets by Saint John, implying that this port has a marginal role in these markets.

- Description of principal commodity flows

By attaching an Index of Categorial Importance (ICI) and a Flow Trend Index (FTI) to each commodity flow, it is possible to establish the nature of the links between an inland region and Saint John (see Tables 8.7 and 8.8)[8]

Table 8.7 lists the ten main commodity categories loaded in Saint John and the eight commodity categories with the strongest national flow trends towards that port other than the categories already included. The average national trend in exporting the various commodities via Saint John is given in the first column, while the last line shows the relative importance of the inland regions in the port's overall trade.[9] Table 8.8,

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[8] The FTI and ICI values are given only if at least one of them is above 0.8.

[9] If desired, it is therefore possible to establish the portion of a region's commodity traffic that is exported via this port by multiplying the FTI by the corresponding value of the national trend in exports via the port. For example, for motor vehicles (No. 58) 58.4% (1.09 x 53.6%) of Ontario's exports flow through Saint John. In the case of the ICI too, one need only multiply this index by a region's share of the total trade passing through the port to obtain that region's contribution to a particular flow of commodities. For example, 97% (2.31 x 42%) of motor vehicles exported via Saint John come from Ontario.

Table 8.7

PORT OF SAINT JOHN
MAIN COMMODITY FLOWS
1981

Main Flows	Average National Trend (%)	Local Areas of Loading: Atlantic FTI	Atlantic ICI	Quebec FTI	Quebec ICI	Ontario FTI	Ontario ICI	Prairies FTI	Prairies ICI	Pacific FTI	Pacific ICI
(58) Road motor vehicles	53.6	0.98	0.07	-	-	1.09	2.31	-	-	-	-
(34) Pulp	68.3	1.37	2.76	-	-	-	-	1.46	1.51	-	-
(45) Nonferrous metals	19.1	2.13	0.12	0.83	1.82	1.03	1.02	1.72	5.23	-	-
(35) Paper and paperboard	36.2	2.34	2.09	0.33	0.84	-	-	2.68	1.52	2.76	N/A
(27) Crude nonmetallic minerals	28.8	1.90	0.08	1.00	4.30	-	-	-	-	-	-
(40) Chemical products	7.9	5.82	0.14	1.13	1.83	0.92	1.29	-	-	1.33	N/A
(06) Cereal preparations	32.1	1.39	2.57	-	-	-	-	-	-	-	-
(52) Special industry machinery	16.5	2.25	0.32	0.54	1.06	1.43	1.56	-	-	-	-
(33) Wood fabricated materials	19.8	3.80	2.43	-	-	-	-	-	-	-	-
(18) Sugar and sugar preparations	47.5	2.10	2.77	-	-	-	-	-	-	-	-
(09) Vegetables	31.4	2.64	2.25	-	-	-	-	-	-	-	-
(03) Fish	14.1	1.53	2.62	-	-	4.18	0.26	-	-	-	-
(01) Meat	65.7	1.17	0.29	0.98	2.43	1.05	0.84	1.05	N/A	1.39	N/A
(36) Textile fabricated materials	20.1	1.34	0.10	0.91	2.68	1.17	0.87	-	-	-	-
(44) Iron and steel products	33.7	2.40	0.16	1.20	3.12	-	-	-	-	-	-
(50) General Purpose Industrial Machinery	20.5	3.53	0.24	-	-	1.26	1.79	1.62	N/A	-	-
(21) Crude vegetable products, inedible	44.7	1.14	0.48	-	-	1.34	1.88	-	-	1.12	N/A
(24) Textile and related fibres	48.9	1.38	0.02	1.06	0.85	0.98	1.91	-	-	-	-
Port's share (100 %)			33.0%		22.5%		42.0%		2.4%		0.2%

Source: Canadian Transport Commission, Transport Industries Analysis.

Table 8.8

PORT OF SAINT JOHN
FLOWS OF SUNDRY END PRODUCTS
1981

Category of End Product	Average National Trend (%)	Local Area of Loading: Atlantic FTI	Atlantic ICI	Quebec FTI	Quebec ICI	Ontario FTI	Ontario ICI	Prairies FTI	Prairies ICI	Pacific FTI	Pacific ICI
(19) Electrical equipment	16.9	3.89	0.38	0.67	1.09	1.05	1.50	-	-	-	-
(20) Special industry equipment	20.6	3.45	0.47	0.27	0.42	1.29	1.72	-	-	2.50	13.59
(21) Household and office accessories	20.2	1.58	0.21	0.38	0.56	1.35	1.72	-	-	-	-
(22) Miscellaneous household articles	23.2	1.76	0.30	0.97	2.13	0.99	1.01	-	-	-	-
(23) Pharmaceutical products	14.4	1.23	0.05	1.02	2.11	1.02	1.21	-	-	-	-
(24) Printed matter and photographic goods	20.4	0.84	0.09	0.92	1.45	1.12	1.53	-	-	-	-
(25) Other end products	22.1	3.94	1.92	0.18	0.51	0.96	0.37	1.98	4.08	-	-
Area Contribution											
a) Miscellaneous end products	100.0%		24.5%		24.6%		47.8%		2.8%		0.3%
b) Total trade	100.0%		33.0%		22.5%		42.0%		2.4%		0.2%

Source: Canadian Transport Commission, Transport Industries Analysis.

set up similarly to Table 8.7, consists of the seven classes of other end products.[10]

Discriminating flows may be said to exist when a port receives more than 51% of the flows of a commodity exported from a given region, and when this same region supplies over 51% of the exports of this commodity loaded in that port. For Saint John this occurs mainly with the Maritimes, i.e. in six of the nine cases. More specifically, these provinces generate the majority of forest products (categories 33, 34 and 35)--the main group of products loaded in Saint John--and most of the sugar (No. 10), vegetables (No. 9) and other end products (No. 25).[11] The other three cases of discriminating flows relate to exports of meat and meat preparations (No. 1) from the Province of Quebec and motor vehicles (No. 58) and crude vegetable products (No. 21) from Ontario.

Two other situations may also occur, namely a) where over 51% of exports of a commodity generated by a region passes through a port but does not represent more than half of that port's trade in that commodity, and b) the reverse situation, where over 51% of a port's exports of a particular commodity originate from the same region but do not represent the majority of those commodities dispatched from that region.

Situation a) involves the concept of privileged microhinterlands for the port concerned. Situation b) relates to port dependence on a given inland region and a given commodity flow.

Generally speaking, Saint John shows port dependence in relation to Ontario and Quebec. Its dependence on Quebec is shown in commodity categories 27, 36 and 44 (i.e. crude and fabricated materials), while its dependence on Ontario is seen in commodity categories 24, 50 and 52 and product classes 20, 21 and 24 (i.e. end products). Only two commodity flows constitute a privileged microhinterland, textile and related fibres (No. 24) from Quebec, and fish (No. 3) from Ontario.

In the Maritimes, only two commodity flows create a situation of port dependence--cereal preparations (No. 6) and

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[10] Table 8.8 incorporates all traffic in the fifth major group of commodities, while Table 8.7 covers 90% of the total value of trade belonging to the first four groups.

[11] It should be noted that this class of end products, as far as the port of Saint John is concerned, is dominated by military equipment.

fish (No. 3). Seven commodity flows constitute privileged microhinterlands, however--commodity categories 24, 27, 44, 50 and 58 and product classes 19 and 20.

No port dependence in relation to traffic from the West can be observed.[12] In spite of Saint John's minor hinterland extensions into the West, however, the Prairies emerge as privileged microhinterlands in respect of commodity categories 34 and 35, and the Pacific is found to be a privileged microhinterland for commodity category 35 and product class No. 20.

In short, the Province of Quebec contributes in large measure to the crude and fabricated materials (except forest products) loaded in Saint John, while Ontario supplies most of the manufactured products handled by this port. The manufactured products originating in the Atlantic provinces show a strong flow trend towards Saint John, though their net weight is markedly lower than that of manufactured products originating in Ontario. The Maritimes play a dominant role in the export of forest products and foods. Only one commodity category, meat (No. 1), is exported mainly via the port of Saint John, regardless of its region of origin.

8.2.4 Halifax

Figure 8.2 shows the relative extension of the hinterland of Halifax.[13]

As in the case of Saint John, the importance of Halifax in relation to the Maritimes is obvious. Some 75% of the commodity flows from the Maritimes show a flow trend towards Halifax that is higher than the national average. The trend is, however, slightly lower than that for Saint John.

Concerning the Quebec and Ontario markets, 40% of the commodity flows show an orientation towards Halifax roughly equivalent to the national average. Halifax's influence is, however, stronger in Ontario than it is in Quebec. A third of the flows from Quebec have an intensity less than 0.4 to 0.79

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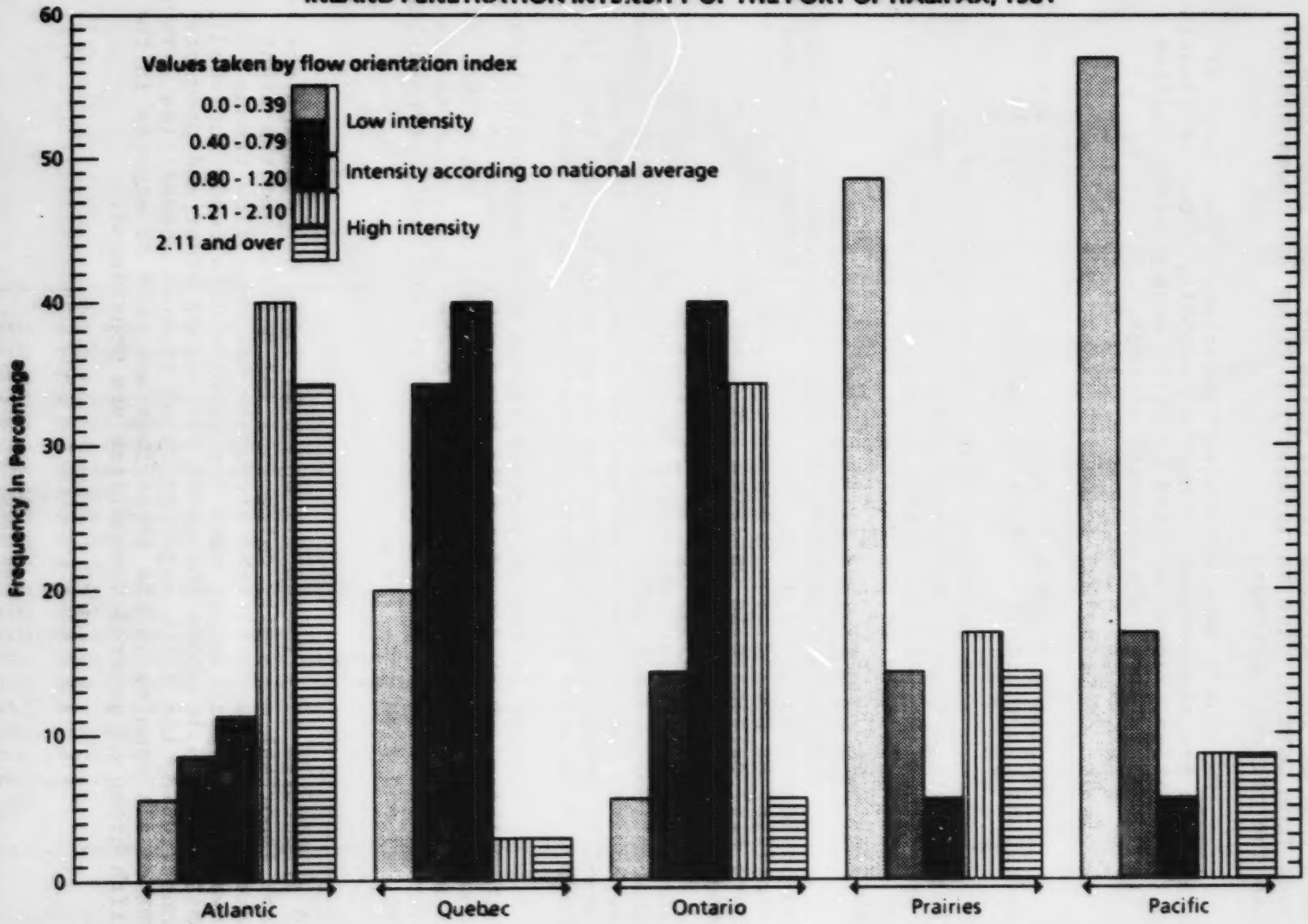
[12] Nevertheless, the Prairies provide significant flows of non-ferrous metals (No. 45) and end product class (No. 25), which represent 13% (5.23 x 2.4) and 10% (4.08 x 2.4) respectively of these commodities loaded in Saint John.

[13] The three interpretation cases given in Table 8.6 still apply since Figures 8.1 and 8.2 are based on the same scales.

Figure 8.2

INLAND PENETRATION INTENSITY OF THE PORT OF HALIFAX, 1981



Source: Canadian Transport Commission, Transport Industries Analysis.

times that of the national trend, while the same proportion of flows from Ontario have an intensity 1.21 to 2.1 times greater than the national average.

Halifax's more extensive hinterlands than those of Saint John are also evident from the commodity flows originating in the Prairies, almost a third of which move towards Halifax in a trend that is above the national average.

- Description of principal commodity flows

Tables 8.9 and 8.10 contain the various statistics describing the microhinterlands of the port of Halifax.[14]

Only five commodity flows can be classed as discriminating flows. Four of these--fish (No. 3), cereal preparations (No. 6), fruit (No. 7) and crude animal products (No. 20)--originate in the Maritimes, while the fifth, wood fabricated products (No. 33), is generated in Ontario.

Halifax's dependence on exports from Ontario is only too obvious when it is noted that 12 of the 14 commodity flows identified as coming from a dominant region (i.e. in proportions above 51%) originate in Ontario. Of these 12 cases of port dependence, eight relate to end products (classes 19, 20, 21 and 23 and commodity categories 50, 52, 58 and 63), two concern fabricated materials (categories 40 and 45) and two involve tobacco (No. 18) and textile and related fibres (No. 24). There is, however, no reverse dependency relationship. Only one commodity category, i.e. fruit and fruit preparations (No. 7), shows a flow trend from Ontario to Halifax that is above 51%.

Quebec is the only other region with dependency links with Halifax. Port dependence is found with respect to nonmetallic minerals (No. 27) and railway rolling stock (No. 57). In addition, two commodity flows from Quebec exhibit an above-average orientation towards Halifax--fruit and fruit preparations (No. 7) and fish (No. 3).

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[14] Structured like Tables 8.7 and 8.8, Table 8.9 contains the ten most important commodity categories for Halifax and the eight categories that exhibit the strongest national flow trends towards this port (other than the categories already included), while Table 8.10 shows the seven classes of other end products constituting the fifth major group of general commodities. Thus, 89% of all exports in the first four and 100% of exports in the fifth group of general commodities are considered.

Table 8.9

PORT OF HALIFAX
MAIN COMMODITY FLOWS
1981

Main Flows	Average National Trend (%)	Local Area of Loading: Atlantic FTI	Atlantic ICI	Quebec FTI	Quebec ICI	Ontario FTI	Ontario ICI	Prairies FTI	Prairies ICI	Pacific FTI	Pacific ICI
(58) Road motor vehicles	29.9	1.60	0.16	-	-	1.06	1.82	-	-	-	-
(40) Chemical products	18.9	2.86	0.10	-	-	1.35	1.52	1.30	1.67	-	-
(03) Fish	55.7	1.38	3.42	0.99	0.67	-	-	-	-	0.19	6.25
(45) Nonferrous metals	11.9	4.50	0.35	0.61	1.42	1.34	1.07	0.86	2.08	-	-
(06) Cereal preparations	45.0	1.23	3.29	-	-	-	-	1.72	2.22	-	-
(33) Wood fabricated materials	27.9	0.89	0.82	0.59	1.45	1.92	0.96	-	-	-	-
(52) Special industry machinery	19.1	3.16	0.65	0.30	0.63	1.50	1.32	0.65	1.02	-	-
(18) Tobacco	48.0	-	-	-	-	1.01	1.91	-	-	-	-
(27) Crude nonmetallic minerals	11.9	3.80	0.22	0.93	4.26	2.06	0.05	-	-	3.44	3.39
(57) Railway rolling stock	42.1	2.09	0.67	0.86	2.87	1.08	0.45	-	-	-	-
(07) Fruit	88.6	1.07	3.02	0.87	0.50	0.96	0.26	-	-	0.66	8.58
(20) Crude animal products, inedible	53.3	1.40	3.06	0.47	0.60	0.69	0.26	0.54	1.17	-	-
(14) Other foods	42.6	2.19	1.38	1.03	1.57	0.67	0.68	-	-	-	-
(63) Communication equipment	38.0	1.88	0.31	0.52	0.54	1.11	1.55	-	-	-	-
(21) Crude vegetable products, inedible	31.3	1.50	0.92	0.87	0.37	0.71	0.81	1.62	9.65	1.60	1.21
(50) General Purpose and Industrial Machinery	25.2	1.10	0.11	0.27	0.47	1.40	1.62	-	-	3.97	4.04
(36) Textile fabricated materials	24.4	2.87	0.32	0.70	2.19	1.48	0.88	-	-	-	-
(09) Vegetables	20.8	0.75	0.92	1.61	1.27	0.81	0.59	1.39	7.03	-	-
(24) Textile and related fibres	19.1	1.70	0.07	1.17	0.99	0.96	1.49	-	-	-	-
Port's share (100 %)			22.9%		21.2%		52.1%		3.0%		0.7%

Source: Canadian Transport Commission, Transport Industries Analysis.

Table 8.10

PORT OF HALIFAX
FLOWS OF SUNDRY END PRODUCTS
1981

Class of End Product	Average National Trend (%)	Local Area of Loading: Atlantic FTI	Atlantic ICI	Quebec FTI	Quebec ICI	Ontario FTI	Ontario ICI	Prairies FTI	Prairies ICI	Pacific FTI	Pacific ICI
(19) Electrical equipment	18.3	1.83	0.26	0.85	1.46	1.05	1.21	0.31	0.02	1.34	0.05
(20) Special industry equipment	18.8	1.47	0.29	0.53	0.86	1.04	1.12	3.97	5.20	1.22	1.91
(21) Household and office accessories	28.4	2.31	0.44	0.67	1.06	1.12	1.28	0.24	0.14	0.11	0.13
(22) Miscellaneous household articles	32.5	1.80	0.44	0.94	2.20	0.97	0.79	0.81	0.55	1.19	0.44
(23) Pharmaceutical products	28.5	2.88	0.16	0.43	0.95	1.52	1.46	0.07	0.05	-	-
(24) Printed matter and photographic goods	24.3	3.09	0.47	1.14	1.91	0.72	0.79	2.16	1.92	1.47	2.80
(25) Other end products	12.2	1.06	0.74	0.53	1.56	2.54	0.78	1.85	3.05	0.96	0.11
Area Contribution											
a) Miscellaneous end products	100.0%		9.7%		33.5%		52.7%		3.7%		0.4%
b) Total trade	100.0%		22.9%		21.2%		52.1%		3.0%		0.7%

Source: Canadian Transport Commission, Transport Industries Analysis.

The close ties between Halifax and the Atlantic provinces appear in 11 privileged microhinterlands. Seven of these relate to end products (commodity categories 52, 57 and 63 and product classes 21, 22, 23 and 24), three concern fabricated materials (categories 40, 45 and 36) and one involves foods (No. 14).

A comparison of Halifax's microhinterlands in the Maritimes with those of Saint John reveals that, in general, Halifax attracts more manufactured products while Saint John handles mainly fabricated products. On the other hand, both depend greatly on the Maritimes for foods, since these provinces produce the bulk of the foods passing through the two ports.

An examination of commodity flows from Western Canada shows that Halifax has farther-reaching hinterlands than does Saint John, particularly with other end products (Table 8.10). Two product classes from the Prairies, special industry equipment (No. 20) and printed matter and photographic goods (No. 24), show over 51% flows to Halifax.

Of the other commodity flows from the West (listed in Table 8.9) five constitute privileged microhinterlands. These are categories 6 and 21 from the Prairies and categories 7, 21 and 50 from the Pacific. While the West does not supply commodities in proportions that are above the national average, two commodity flows from the Prairies--crude vegetable products (No. 21) and vegetables (No. 9)--do represent 29% and 21% of these commodities handled by Halifax.[15]

We can see the general concentration of refrigerated products in Halifax in the fruit and fruit preparations (No. 7), vegetables and vegetable preparations (No. 9) and crude vegetable products (No. 21) which the various regions supply in quantities that are either above or around the national average.

In short, the following general characteristics emerge concerning Halifax's hinterland extensions:

- the port has diversified penetration into the overall Canadian export market;
- Halifax port activity depends heavily on Ontario, which is the object of 12 of Halifax's 14 instances of port dependence;

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[15] More precisely, 28.95% (9.65 x 3) for crude vegetable products and 21.09% (7.03 x 3) for vegetables.

- commodity flows from Quebec correspond more or less to the national averages, and the commodities themselves are varied;
- the range of products coming from the West is relatively narrow, although the commodity flows are high;
- there are 21 privileged microhinterlands, 11 in the Maritimes and 7 in the West; and
- the three main commodities handled--fruit (7), fish (3) and crude animal products (20)--come chiefly from the Maritimes.

8.2.5 Montréal

Section 8.1 described the overall dominance of Ontario and Quebec in regard to Montréal's port activity. The western provinces generate a limited amount of trade, while commodity flows from the Maritimes are negligible.

Although certain regional commodity flows account for low percentages in the total exports loaded in Montréal, the same flows may be predominantly attracted to this port. This situation is reflected in Figure 8.3, particularly with the western provinces.[16]

In both commodity value (Table 8.4) and flow trend indices, the Maritimes are marginally served by Montréal. However, the port has significant hinterland extensions to the West. Forty-six percent of the Prairies' principal commodities arrive at the port of Montréal in proportions above the national average, while the Pacific shows an above-average flow trend in 37% of its exports.

The Pacific flow trend requires some elaboration. Table 8.2 indicates that 82% of Pacific trade moving to the ports studied passes through Montréal. There is no contradiction here. The two sets of statistics merely show that exports originating in the Pacific area and loaded in the ports studied involve a limited number of general commodities, which are concentrated in Montréal. Thus, although Montréal's hinterland extensions into the Pacific market are greater than those of the other three ports, the West is served mainly by the Pacific ports.

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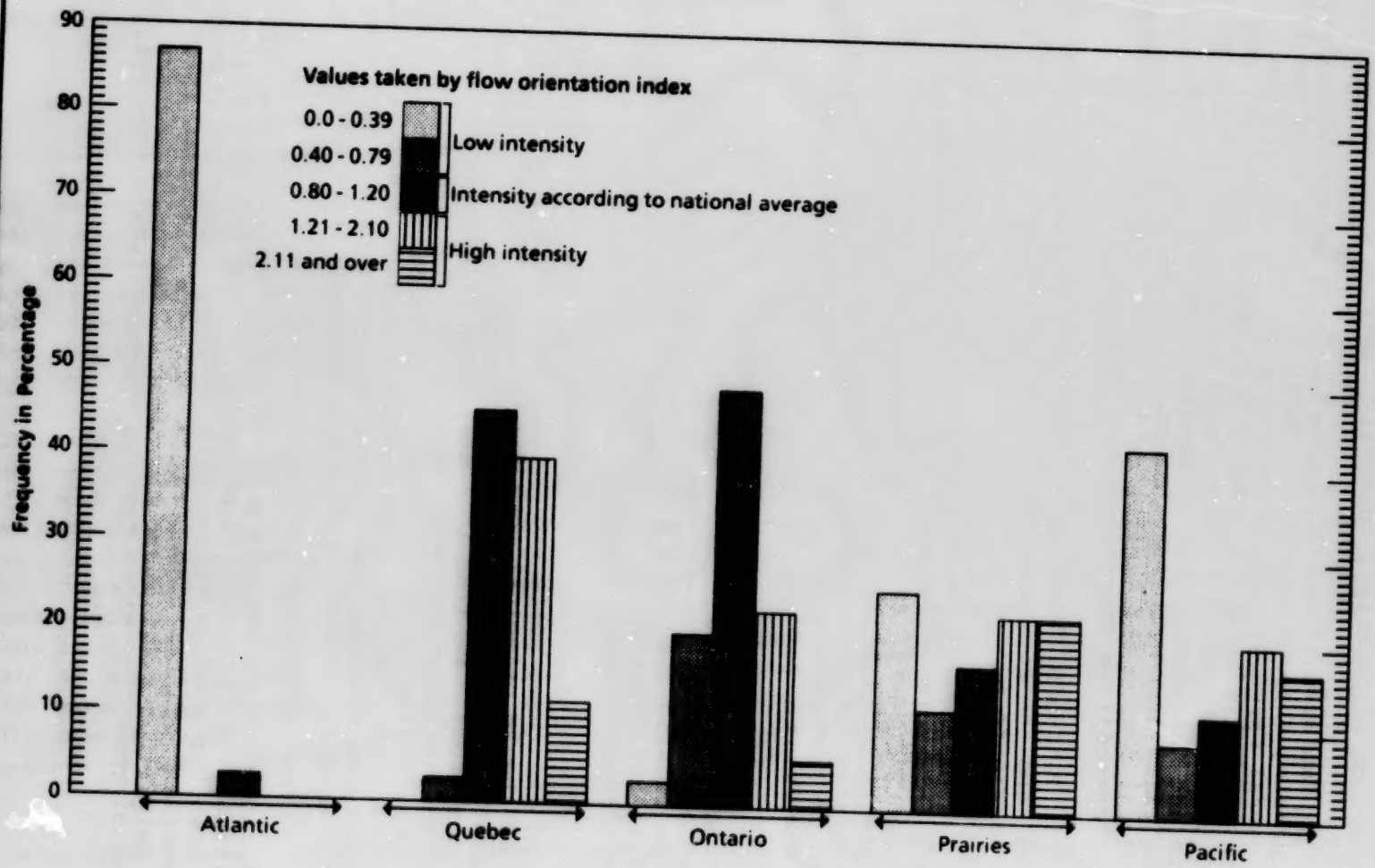
[16] This Figure is structured similarly to Figures 8.1 and 8.2 and the interpretations given in Table 8.6 remain valid.

Figure 8.3

INLAND PENETRATION INTENSITY OF THE PORT OF MONTRÉAL, 1981



Source: Canadian Transport Commission, Transport Industries Analysis.

- Description of principal commodity flows

Tables 8.11 and 8.12 show the main general commodity flows passing through Montréal. Table 8.11 deals with the first four general cargo groups, while Table 8.12 covers all the classes of the fifth group. Table 8.11 contains the ten main commodity categories that figure most prominently in this port's traffic and the eight other categories with the strongest national flow trends towards Montréal. Those 18 commodity flows account for 87% of all exports in the first four major groups of general commodities dispatched from Montréal.[17]

Tables 8.11 and 8.12 reveal the strong ties between Montréal and the Provinces of Ontario and Quebec, as already shown in Figure 8.3.

Of the 25 most significant commodity flows directed towards this port, only three are not, in relation to the Province of Quebec, either mainly exported via Montréal or commodities originating mainly in Quebec. These are ore concentrates (No. 25) and miscellaneous foods (No. 14), over 65% generated in Ontario, and fish (No. 3), over 65% of which comes from the Pacific area.

Montréal's hinterland extensions into the Ontario market are less pronounced than those observed in Quebec. As stated previously, Halifax and Saint John have a greater influence on Ontario than on Quebec. Nevertheless, the links between Montréal and Ontario are, generally speaking, stronger than the links between either Halifax or Saint John and Ontario.

To illustrate this last point, the relations between each of the three ports and Ontario were compared in respect of each of the 28 principal commodity categories listed in Table 7.2 (Chapter 7) and the seven product classes in the other end products group. We find that the three ports have an over 51% dependency relationship with Ontario that takes a similar form, each port having 10 to 13 commodity flows originating chiefly in this province. On the other hand the different nature of the ties between Montréal and Ontario emerges from the fact that only four commodity categories show a predominant flow towards either

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[17] Because of the low commodity flows to Montréal from the Maritimes, the FTI and ICI numerical values for this region have not been recorded in Tables 8.11 and 8.12. Only two commodity categories register flows over $1 million, viz. fish ($1.7 m.) and pulp ($3.1 m.). These two alone represent 54% of the total value of commodity flows between the Maritimes and Montréal.

Table 8.11

PORT OF MONTRÉAL
MAIN COMMODITY FLOWS
1981

Main Flows	Average National Trend (%)	Local Area of Loading*							
		Quebec		Ontario		Prairies		Pacific	
		FTI	ICI	FTI	ICI	FTI	ICI	FTI	ICI
(45) Nonferrous metals	68.3	1.11	1.12	0.94	0.87	0.83	1.60	1.46	0.06
(40) Chemical products	61.2	1.02	0.76	0.99	1.29	1.23	1.24	-	-
(25) Ore concentrates	38.8	0.42	0.44	1.60	1.65	2.46	0.60	2.58	0.86
(52) Special industry machinery	64.1	1.33	1.21	0.74	0.76	1.35	1.66	1.56	0.21
(27) Crude nonmetallic minerals	48.8	1.01	2.01	1.13	0.03	-	-	0.84	0.25
(58) Road motor vehicles	16.1	5.26	0.85	0.60	1.20	5.94	1.27	-	-
(36) Textile fabricated materials	55.0	1.17	1.58	0.72	0.50	1.64	0.04	-	-
(03) Fish	30.2	1.39	0.41	-	-	2.31	2.94	2.96	29.97
(34) Pulp	21.8	2.88	1.15	3.54	0.88	-	-	-	-
(50) General purpose industrial machinery	54.0	1.54	1.16	0.72	0.96	1.03	0.19	-	-
(09) Vegetables	47.8	1.23	0.42	1.50	1.29	1.18	4.69	1.97	1.36
(46) Metal fabricated basic products	64.3	1.12	0.87	0.99	1.27	-	-	2.42	0.22
(63) Communication equipment	53.0	1.44	0.65	0.92	1.51	1.89	0.06	-	-
(18) Tobacco	41.4	1.34	0.05	0.99	2.17	-	-	2.42	0.22
(10) Sugar	49.6	1.91	1.57	1.44	0.52	-	-	-	-
(57) Railway rolling stock	39.3	1.35	1.96	-	-	-	-	-	-
(51) Material handling equipment	74.5	1.17	1.16	0.84	0.91	-	-	1.15	0.88
(14) Other foods	42.5	1.10	0.73	1.20	1.42	-	-	2.10	0.25
Port's share (100%)			48.9%		44.7%		3.8%		2.3%

* Owing to the minimal flows between the Maritimes and the port of Montréal, the ICIs and FTIs for the Maritimes are not significant, where the relative part of the flow is only 0.3%.

Source: Canadian Transport Commission, Transport Industries Analysis.

Table 8.12

PORT OF MONTRÉAL
FLOWS OF SUNDRY END PRODUCTS
1981

Class of End Product	Average National Trend	Local Area of Loading*							
		Québec		Ontario		Prairies		Pacific	
		FTI	ICI	FTI	ICI	FTI	ICI	FTI	ICI
(19) Electrical equipment	64.0	1.11	0.83	0.98	1.32	1.47	0.08	1.18	0.01
(20) Special industry equipment	60.4	1.39	0.98	0.89	1.12	0.42	0.43	0.42	0.20
(21) Household and office accessories	51.4	1.42	0.97	0.80	1.06	1.82	0.83	1.89	0.68
(22) Miscellaneous household articles	44.3	1.06	1.07	1.03	0.99	1.65	0.88	1.38	0.15
(23) Pharmaceutical products	57.1	1.28	1.22	0.74	0.82	1.71	0.89	-	-
(24) Printed matter and photographic goods	54.9	0.96	0.70	1.08	1.38	0.86	0.61	1.17	0.63
(25) Other end products	33.9	1.16	1.49	1.41	0.51	0.86	1.12	2.55	0.09
Area Contribution									
a) Miscellaneous end products	100.0%		50.5%		46.5%		2.4%		0.5%
b) Total trade	100.0%		48.9%		44.7%		3.8%		2.3%

* Owing to the minimal flows between the Maritimes and the port of Montréal, the FTIs and ICIs for the Maritimes are not significant, contribution from this region to shipping of miscellaneous end products is 0.1% and 0.3% for total trade.

Source: Canadian Transport Commission, Transport Industries Analysis.

of the two Atlantic ports, whereas 13 commodity flows gravitate mainly towards Montréal.[18]

More specifically--see Table 8.11 and 8.12--seven commodity flows originating in Ontario can be said to be discriminating flows in that they are oriented mainly towards Montréal and in that those same seven types of commodity come largely from Ontario. These discriminating flows involve the following commodities: food categories (Nos. 9 and 14), crude materials category (No. 25), fabricated materials categories (Nos. 40 and 46) and end product classes (Nos. 21 and 24).

Eight commodity flows from Quebec can be regarded as discriminating: commodity categories Nos. 50, 51, 52 and 57 from the industrial machinery and transportation equipment group, fabricated materials categories Nos. 34, 36 and 45 and the sugar and sugar preparations (No. 10).

That Montréal has greater hinterland extensions to the West than do Halifax and Saint John is confirmed by the higher amount of principal commodity flows with flow trend indices above 0.8.[19] Though the western provinces contribute only marginally to Montréal's trade in most commodities, two categories are significant. In 1981, these provinces supplied 76% of all fish (No. 3) and 21% of all vegetables (No. 9) loaded in Montréal.

8.3 Overall Analysis

This section summarizes the general relations between Montréal, Halifax and Saint John and the overall Canadian export market. The 25 most prominent general commodities of each of the ports were categorized on the basis of their FTI and ICI values. Table 8.13 shows the results:

a) Saint John has the weakest hinterland, 73 out of 125 commodity flows (i.e. 58.4%) being marginal flows. In addition, this port shows the lowest

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[18] Of the other 18 flows from Ontario, 11 are directed towards the three ports in more or less equal proportions, six are oriented towards Montréal and Halifax in roughly equal proportions and one is shared by Halifax and Saint John. A booklet of results, available on request, gives a detailed analysis, by inland region and port, of internal flows of general cargo exported via the four ports studied.

[19] I.e. showing a trend that is either around or above the average national trend.

diversification of its inland markets[20]: of the 52 nonmarginal flows 22 (42%) are either discriminating flows or port-dependence flows.

b) Halifax shows considerable diversification of its inland markets, since 76 out of 125 flows (i.e. 60.8%) reach it with intensities equal to or above the national average without registering port dependence. Halifax also has the lowest number of marginal flows, i.e. 30 out of 125, or 24%.

c) Montréal has some very strong hinterland extensions. Of the 125 flows, 48% are either discriminating flows or flows denoting privileged microhinterlands. In other respects, a third of the flows oriented to Montréal are marginal, but an equal number represent privileged microhinterlands.

d) The last two lines of the table show that of a total of 510 regional flows[21], 114 (32 discriminating flows and 82 cases of privileged microhinterlands) are at least 51% directed towards one particular port. This is a significant amount because, if there was only one loading port instead of three, the possible number of flows would be no more than 170 (34 commodities x 5 regions x 1 port). It should also be noted that these 114 flows account for 52% of all general cargo loaded in the three ports in 1981.

The 51% threshold does not, however, allow of any real dominance in port-oriented flows. Increasing the threshold to 65% would seem more sensible. This would result in 74 dominant

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[20] Not counting the port of Québec, which depends on the Province of Quebec for 90% of its trade and whose four most important commodities represent 80% of the value of that trade.

[21] Of the 25 most important products of each of the three ports, only 34 commodity categories can be counted after eliminating duplication. Consequently, a possible total of 510 flows, should be considered (34 commodities x 5 regions x 3 ports = 510 flows). The figure of 34 comprises 27 of the 28 main categories listed in Table 7.2 and the seven end product classes of the fifth major group of general commodities. The only principal commodity which is not a dominant one for the three ports is dairy products (No. 5), 46% of which is handled by Québec.

Table 8.13

INLAND EXTENSION OF PORT ACTIVITIES
EXPORT OF GENERAL CARGO
1981
(in percentages)*

Ports		Discriminating Flows (1)	Privileged Micro-Hinterlands (2)	Port Dependence (3)	Nondominant Substantial Extensions (5)	Marginal Flows	Total
Saint John		7.2	13.6	10.4	10.4	58.4	100 (125)**
Halifax		4.0	16.8	11.2	44.0	24.0	100 (125)
Montréal		12.8	35.2	5.6	11.2	35.2	100 (125)
All three ports:	%	6.3	16.1	9.6	28.2	39.8	100
	No.	32	82	49	144	203	510

Note: "Nondominant substantial extensions" covers all commodity flows equal to or greater than the national average trend toward the port concerned other than those in (1), (2) and (3). "Marginal flows" represent all commodity flows not included in the preceding categories and having a weak port orientation.

* As established on the basis of the FTI and ICI calculations.

** The total number of flows is indicated in brackets.

Source: Canadian Transport Commission, Transport Industries Analysis.

general commodity flow trends worth $1.7 billion, or 29% of the total value of exports passing through the three ports.[22] Tables 8.7 to 8.12 suggest that the great majority of those flows, at least 65% directed towards one particular port, are related to two factors:[23]

1) Specialization of the port in question with respect to certain products and
2) The direct benefits of proximity to shippers and to a port.

In other words, a large proportion of Canadian exports of general cargo dispatched via the ports studied show a diversity of port-oriented flow trends. Figure 8.4, which considers inland flows to Québec as well as to the three other ports, shows that in 1981 the port orientation of inland flows of general cargo was relatively diversified: 59% of the four ports' export trade correspond to flow trends with relative intensity to a particular port fluctuating between 20% and 65%. On the other side, the existence of privileged links between the ports and the regions, as explained in the preceding sections, is corroborated by the fact that 48% of the ports' trade is made up of individual flows whose relative port orientation intensity is greater than or equal to 60%.

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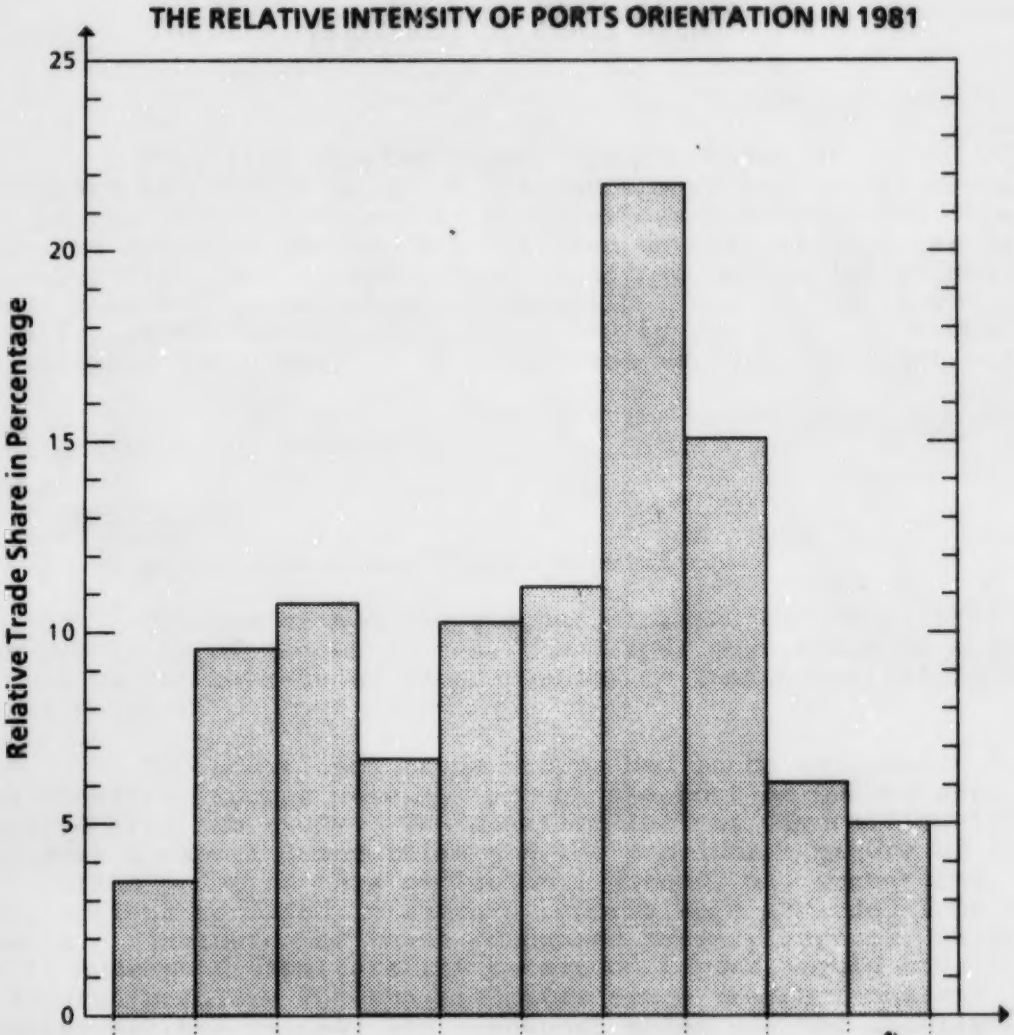
22 The $1.7 billion comprises 27% of Montréal's total exports, 46% of Saint John's exports and 12% of Halifax's exports.

23 These two factors would tend to explain the port orientations of 39 of the 74 dominant flows, i.e. 88% of the total value of the dominated trade. The other 35 dominant orientations in 1981 scarcely represented $200 million, or 12% of the dominated trade.

Figure 8.4

PERCENTAGE DISTRIBUTION OF TRADE LOADED AT THE PORTS UNDER STUDY IN TERMS OF THE RELATIVE INTENSITY OF PORTS ORIENTATION IN 1981



10 and less	10.1 to 20	20.1 to 30	30.1 to 40	40.1 to 50	50.1 to 60	60.1 to 70	70.1 to 80	80.1 to 90	90.1 and more	
3.5	9.6	10.8	6.7	10.3	11.2	21.8	15.1	6.1	5.0	100%
13%		39%				37%		11%		100%
13%		59%				28%				100%

Relative Flow Intensity (%)

Source: Canadian Transport Commission, Transport Industries Analysis

Chapter 9

INLAND MODES OF TRANSPORT CONVEYING CARGO TO PORTS

This last chapter identifies the modes of inland transport of general cargo to the four ports for export overseas. Unlike the statistics used in the previous chapters, the data required for this chapter had not been entered in computer files. Consequently, the transport data contained on the individual B-13 forms have had to be collected manually. Due to the large quantity of documents involved, we had to use sampling techniques to estimate the proportional use of the various transport modes.

The first section describes the method used; the other sections show the results.

9.1 Methodology

9.1.1 Sampling Scheme and Target Population

Because of budgetary constraint and others related to the precision of the estimates, the target population of the sample had to be reduced in proportion to that described in the first chapter.

Two additional trade groups had to be excluded.[1] First, all Canadian exports passing through the port of Québec were omitted from the study. The relative lack of diversification of the port's export commodities and the provincial nature of its activities prompted this exclusion. Second, all commercial transactions recorded in summary reports were excluded from the sample.[2] Inclusion of these condensed summary reports, which a small number of exporters are permitted to use, would have presented problems for the estimates since transactions may involve extreme values, and transport modes are not usually recorded in these reports. On the basis of preparatory work

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[1] As indicated in Chapter 3, commercial transactions involving bulk commodities, re-exports and all special transactions are excluded from this report.

[2] Because certain companies highly active in foreign trade operate a large number of shipments, Statistics Canada may authorize them to submit the required information by way of "summary reports". In many cases, these reports are computerized records of the company's monthly export shipments.

prior to the establishment of the sample, it was possible to determine that the summary reports relate to four particular export sectors: ore concentrates and scrap (No. 25), crude nonmetallic minerals (No. 27), nonferrous metals (No. 45) and motor vehicles (No. 58).[3]

In view of the above, a probability sample of 3 000 transactions registered as exports was selected from the 92 000 commercial transactions involving the ports of Saint John, Halifax and Montréal in 1981. Since the size of the sample was determined by the budget for the project, these exclusions meant more accurate estimates of the target population.

9.1.2 Sample Design

Since the object was to provide estimates, for each port, of the relative use of the various inland modes, two major variables had to be considered: the geographical location of the shipper (local points of loading) and the type of commodities transported. Since we knew the relative importance of each of the ports within the total population and each of the inland regions and the commodities they exported, we chose a stratified sampling procedure.

Stratified, as opposed to random, sampling, is generally considered to provide a better description of the target population because the more efficient sampling design reduces errors in sampling.[4] This procedure consists in dividing the target population into strata of known sizes and carrying out sampling according to the relative importance of each stratum. In this way, the structure of the sample represents the structure of the target population. The method is even more efficient since the strata subgroups are heterogeneous, of which the individual elements of the subgroups are homogeneous.

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[3] These four export sectors represent about three-quarters of the total value of trade thus excluded. But these exports are not recorded solely in the summary reports. Since exports are declared on the B-13 forms, they too can be considered during the sampling process. More precisely, the B-13 forms account for 44% of the total value of exports of ore concentrates, 63% of nonmetallic mineral exports, 61% of nonferrous metals and 75% of motor vehicles and parts.

[4] For an examination of the various sampling methods, the reader might consult G.W. Snedecor and W.G. Cochran (1980), Statistical Methods, and W.A. Wallis and H.V. Roberts (1962), Statistics - A New Approach.

On the basis of these considerations, we first divided the 3 000 transactions to be sampled among the three ports in proportion to the total number of transactions recorded for each. Next the transactions were sampled separately for each port according to

i) the five major groups of general cargo
ii) the five Canadian geographical regions.

In the majority of cases, the number of transactions sampled in this way was proportional to the number of transactions found in the target population. Because of the small number of transactions noted between a port and an inland region for certain groups of general cargo, a higher number of transactions was sampled in these cases than was dictated by the system of proportional representation. Reasonably accurate estimates could therefore be expected in these situations.[5] Appendix I shows precise details about the distribution of the sample transactions over each of the three ports. Using this systematic probability sample design, Statistics Canada collected 3 000 transactions for the Canadian Transport Commission.

9.1.3 Value Estimates of the Relative Use of Inland Transport Modes

Estimates were produced for each of the three ports according to the five local regions of loading and to the five major groups of general cargo. To convert the results of this sampling into target population statistics for each of the ports, each transaction sampled had to be increased by the number of non-sampled transactions for every sampled one. This number, known as the weighting factor, is the product of the inverse of the ratio between the number of transactions sampled in the stratum in which the transaction falls and the real number of transactions in that stratum of the target population. The population estimates are then obtained for any characteristic (e.g. total value of transactions) by multiplying the value of each transaction in the sample by the weighting factor and summing over all transactions.

Since the unit of measure was the monetary value of each of the transactions, it was important to keep this in mind when calculating the weighting factors and hence the value estimate of the relative use of each of the modes. To this end,

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[5] See Wallis and Roberts (1962), Section 12.9, pp. 396-399.

five transaction value groups were established in order to obtain more effective estimates of the proportional use of each mode for inland transportation of general cargo.[6]

This explanation of the estimation procedure can be expressed as follows:

Let N_{ij} = the total number of commercial transactions recorded in a given port (Halifax, Saint John or Montréal) within stratum i and value group j;

n_{ij} = number of sampled transactions from N_{ij} for which the inland mode of transport was identified;

v_{ij} = value of a sampled transaction from n_{ij} with characteristic v, e.g. the value of a transaction involving inland trucking;

where j = the five value groups
i = the various strata defined by the five local regions of loading and the five major groups of general cargo.

On the basis of this notation, the weighting factors are obtained by using the formula:

(1) $W_{ij} = N_{ij}/n_{ij}$ and

the value estimate of the use of transport mode v in terms of a given port's target population is:

(2) $\hat{V} = \sum_i \sum_j v_{ij} W_{ij}$.

Thus, the estimate of the use of a given mode in relation to all modes for a given port is obtained in the following manner:

(3) $\hat{V}^r = \sum_i \sum_j v_{ij} W_{ij} / \sum_i \sum_j \sum_v v_{ij} W_{ij}$

The following subsection gives the various measures proposed for evaluating the reliability of the estimates produced.

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[6] Each sampled transaction was placed in one of the following five value groups: up to $2 499; $2 500 to $9 999; $10 000 to $24 999; $25 000 to $99 999; $100 000 and above.

9.1.4 Measures of Reliability of Estimates

Each of the estimates produced in this chapter has two statistical measures attached to it indicating the degree of precision of the estimates: the 95% confidence interval and the coefficient of variation.

A 95% confidence interval indicates that in 95% of the samples, the true value of the statistic lies between the highest and lowest values in the range, i.e. in the case of this study roughly twice the standard deviation from the average. The coefficient of variation, relating to the standard error of the estimate to the size of the estimate, is a nondimensional quantity independent of the units chosen. The advantage of the coefficient of variation is that it enables the various estimates to be compared to their reliability. Generally speaking, the lower the coefficient the greater the reliability of the estimate, and vice versa.

Table 9.1 classifies the estimates according to the range of variation of their coefficients.[7]

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[7] This classification, also used in the study by D. Napier (1982), Multimodal Transport in Canadian International Trade, is, admittedly, subjective. It is not very different, however, from the system employed by Statistics Canada in a survey on commodity transportation by road, Catalogue 53-224, 1980, p. 16-18.

Table 9.1

CLASSIFICATION OF ESTIMATES ACCORDING TO THEIR COEFFICIENTS OF VARIATION

Range of C.V.	Designation
0 - 5.5%	Very reliable
5.6 - 10.5%	Reliable
10.6 - 25.0%	Somewhat reliable
25.1 - 33.3%	Limited reliability
33.4%+	Not reliable

Calculation of the standard deviation for each of the estimates produced occurred in three stages.[8] First, the variance for each of the value groups was calculated. Second, the weighted sum of these variances gave us the total variance of the estimate. The weight attributed to each value group was its relative importance (squared) in terms of the target population. Third, the standard deviation is obtained by calculating the square root of this variance. As an illustration:

Let $S^2_{ij}(v)$ = variance in stratum i and value group j concerning the description of characteristic v

The variance is obtained in the following manner:

$$(4)\quad S^2_{ij}(v) = \sum_{v_{ij} \epsilon j} (1/n^*_{ij} - 1)(v_{ij} - \bar{v}_{ij})^2$$

Thus the variance of the estimate within stratum i for any value group becomes

$$(5)\quad S^2_i(v) = \sum_j (N_{ij}/N_i)^2 \, S^2_{ij}(v)/n^*_{ij}$$

where n^*_{ij} = number of sampled transactions from n_{ij} with characteristic v ($n_{ij} = \sum n^*_{ij}$)

$\bar{v}_{ij}$ = average value of sampled transactions from n_{ij} with characteristic v

N_i = number of transactions observed within stratum i ($N_i = \sum_j N_{ij}$).

8 Snedecor and Cochran, Statistical Methods, pp. 443-445.

Thus, the formula for the coefficient of variation is

$$(6)\ CV(\hat{V}_i) = \frac{S_i^2(v)^{1/2}}{\hat{V}_i} \times 100 = \frac{S_i(v)}{\hat{V}_i} \times 100$$

9.1.5 General Comments on the Estimates

The estimates on the proportional use of the various transport modes were established on the basis of the monetary value of each of the shipments and not data expressed in tonnes or tonne-miles. It is possible, therefore, that the estimation results presented in this study differ from those based on data expressed in other units of measure. Selection of the monetary value of shipments as the unit of measure may mean a general overestimation of the market share attributed to trucking and an underestimation of low-unit-value traffics.

Moreover, it may be useful to recall that these estimates relate only to the movement within Canada of general cargo intended for export overseas.[9] Interprovincial movements of goods within the framework of national trade are not considered in this report.

Finally, the base documents contain no information on piggyback movements of merchandise. Therefore, it is impossible to establish the extent of this means of inland transport of general cargo exported overseas via the ports studies.[10]

An evaluation of the reasonableness of the estimates is provided in Section 9.4 which indicates that the estimates produced as part of this study may be regarded as reasonable.

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[9] Commodity movements within Canada in the context of trade between the United States and Canada are the subject of a separate study: Truck Transport and Canadian-U.S. Trade, Canadian Transport Commission, Research Branch, May 1983 (preliminary study).

[10] An article published in the October 1982 issue of Canadian Transportation and Distribution Management and condensed in the News Summary of Canadian Pacific, Vol. 38, No. 43, October 29, 1982, states that for the important Toronto-Montréal segment "... intermodal services of CP Rail and CN Rail hold less than 10% of the market versus the million or so truck loads along Highway 401 each year."

9.2 Presentation of Overall Results

The results of the estimation of the proportional use of the various transport modes are given in Table 9.2. In addition, to facilitate identification of the inland access routes to each of the ports studied, an illustration of the major CN and CP railway lines is provided in Figure 9.1.

The various estimates of the proportional use of each transport mode in the inland movement of general cargo intended for export overseas are shown (in Table 9.2) under "Percentage distribution". These estimates, derived from a sampling procedure, must be interpreted in light of the coefficients of variation (C.V.) for each of the value estimates produced for the individual modes. Generally speaking, the estimates for the road and rail modes may be labelled "reliable" to "somewhat reliable", while the estimates concerning inland shipping and air transport are found to have "limited reliability" or to be "not reliable".

Four general observations can be made on the basis of Table 9.2.

First, as shown in the last line, road transport dominates all the other modes with a figure of 83% (6.2.).[11] The rail mode follows far behind with only 16% (6.7). Although inland waterways and air transport were identified for certain commodity flows, estimates for the water mode have limited reliability while those for the air mode are unreliable. It may be noted at this point that inland shipping is used mainly for trade originating in Quebec, while air transport is used mainly for commodities from Ontario.

Second, there is considerable variation in the use of the individual modes according to the province or province bloc. Thus, the railways carry the great majority of trade coming from the Prairies and the Pacific. The 32% figure for road traffic from the Pacific must be viewed in the light of its "limited reliability" designation (C.V. of 25.4%) and is probably too

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[11] Unless otherwise indicated, the bracketed figures following percentages or monetary values represent coefficients of variation.

Table 9.2

ESTIMATES OF THE PROPORTIONAL USE OF INLAND MODES OF TRANSPORT
TO THE PORTS OF SAINT JOHN, HALIFAX AND MONTRÉAL,
TAKEN AS A GROUP
CANADIAN OVERSEAS EXPORTS OF GENERAL CARGO
1981

Local Area of Loading	Road		Rail		Sea*		Air		Percentage Distribution				
	Estimates ($ million)	C.V. (%)	Estimates ($ million)	C.V. (%)	Estimates ($ million)	C.V. (%)	Estimates ($ million)	C.V. (%)	Road	Rail	Sea	Air	Total
Atlantic	538.9	12.9	168.8	5.1	3.6	80.6	-	-	75.8	23.7	0.5	-	100
Quebec	1 539.8	9.0	240.5	9.1	23.5	23.4	0.5	35.8	85.3	13.3	1.3	N/A	100
Ontario	1 523.8	10.7	154.6	5.5	0.1	76.9	5.0	35.4	90.5	9.2	N/A	0.3	100
Prairies	40.5	3.8	110.0	15.9	0.1	31.6	-	-	26.9	73.0	0.1	-	100
Pacific	18.1	25.4	39.0	17.4	-	-	-	-	31.7	68.3	-	-	100
Canada	3 661.1	6.2	712.9	6.7	27.3	31.1	5.5	35.9	83.1	16.2	0.6	0.1	100

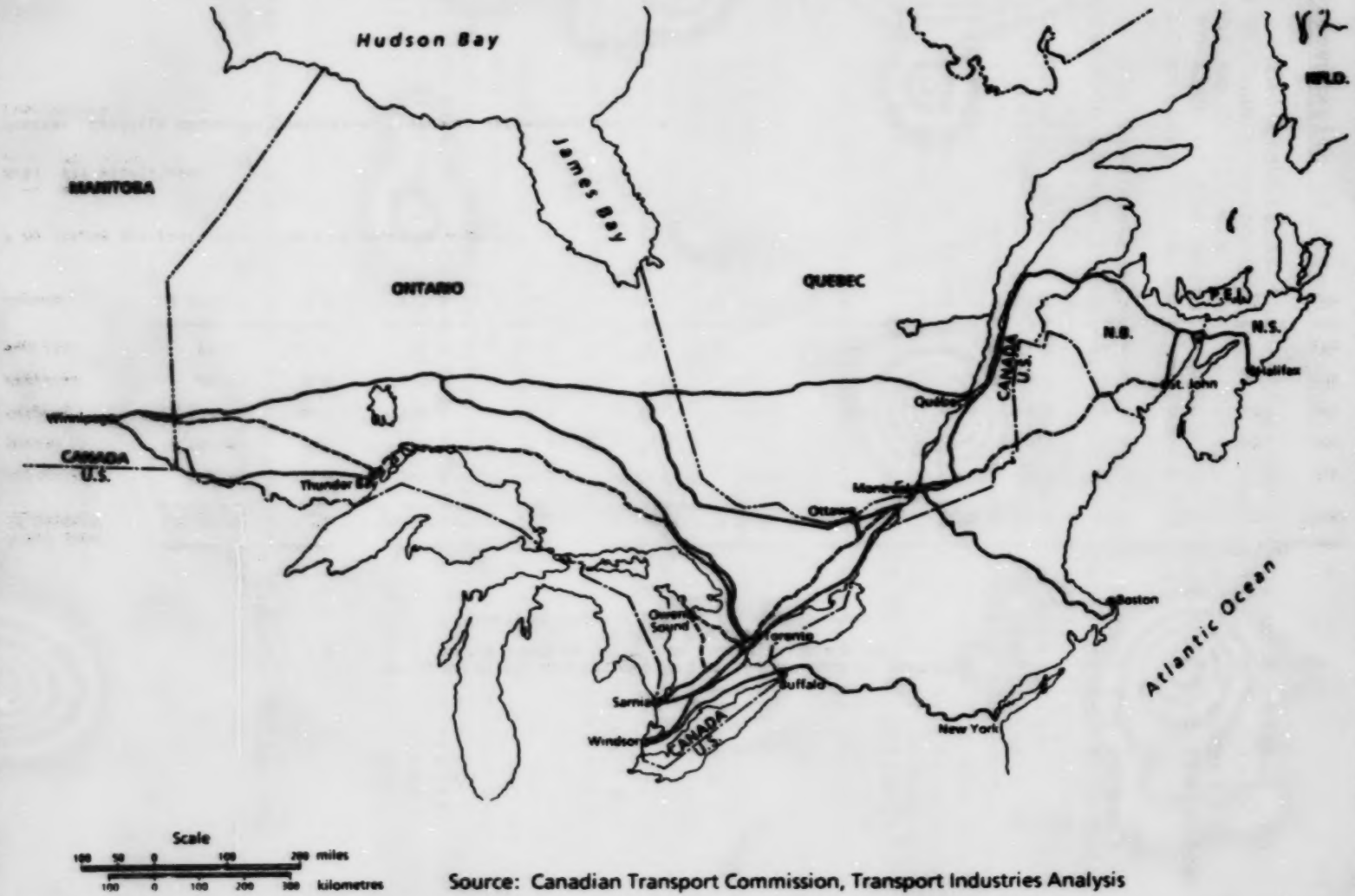
* By inland sea route to the port of overseas export.

-: Nil
N/A: Not significant

Source: Canadian Transport Commission, Transport Industries Analysis.

Figure 9.1

EASTERN CANADA'S MAJOR RAILWAY NETWORK



Source: Canadian Transport Commission, Transport Industries Analysis

high. Nevertheless, the estimates confirm what had been supposed: the distance factor gives rail the edge over road.[12]

Third, the overwhelming majority of trade originating in Quebec and Ontario is transported to the ports by truck. The rail mode represents only 13% by value (9.1) of commodity flows from Quebec and 9% (5.5) of movements from Ontario.

Fourth, rail is important in the transportation of commodities from the Maritimes to the ports of exit. Approximately one-quarter of the trade from the Atlantic provinces is transported by rail. (Halifax and Saint John together handle together 99% of this region's exports--see Table 8.2.) This would suggest that the choice of inland transport mode is dictated not simply by distance but also by the important factor of the type of commodities to be transported.[13] The following sections will elaborate on the effect that the category of commodity has on the choice of transport mode.

9.3 Inland Transport Modes by Port

Tables 9.3 to 9.6, presented at the end of this section, give the estimates on the proportional use of inland transport modes by port and major group of general cargo.

9.3.1 Saint John

According to the results of the sample survey (Table 9.3) Saint John has the fewest distinctive features of the three ports (examined as a group in Table 9.2). Except in the case of trade from the Prairies, trucking accounted for over 85% of the general cargo loaded in Saint John for export overseas in 1981. Just over two-thirds of commodity flows from the West (weak flows originating mainly in the Prairies--Table 8.1) reached Saint John by rail. It will be noted that the coefficients of variation for the Prairie provinces are high--a phenomenon directly related to the sparse traffic between the Prairies and this port.

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[12] A study on intermodal transport for containers and trailers conducted on behalf of Transport Canada and the Canadian Transport Commission and completed in 1980 suggests that rail has an advantage over road transport when the distance exceeds 750 miles. CTC, Research Branch, Intermodal Transportation for Containers and Trailers: An Exploratory Study, Report 10-80-10E.

[13] For a brief examination of rail vs. road competition, see CTC, Research Branch, Competition and Regulation in the Railway Freight Industry, Report 1982/09E (especially Chapter 6).

An examination of the statistics relating to the types of general cargo conveyed by the individual modes (Table 9.6) shows that, in the case of Saint John, there is some rail vs. road competition, chiefly in food products, fabricated materials and other end products. However, the contribution of rail transport, varying between 12% and 19%, remains below that of road transport. Each of these estimates has a relatively low coefficient of variation, allowing us to use the designation of "reliable" or "somewhat reliable".

As to the type of commodities transported by the individual modes, Table 9.3 indicates that fabricated materials and foods make up just over three quarters of the value of rail movements, whereas trucking is more diversified. Nevertheless, fabricated materials, especially forest products and nonferrous metals, are the principal commodities transported to Saint John by the two modes.[14]

9.3.2 Halifax

Road transport is the most common mode for Canadian goods reaching the port of Halifax for export overseas. At the same time, however, Halifax is more dependent on rail than the other ports. In 1981, around 30% (4.5) of the total value of its export trade was transported to the port by rail (see Table 9.4).

This strong representation of the rail mode is noted throughout the regions. Rail transports over 80% of commodities from the West, 40% (7.1) from the Maritimes and 32% (2.3) from Quebec. Trucking, however, accounts for 85% (14.6) of general cargo movements from Ontario.[15] Some use is also made of inland shipping and, to a much lesser extent, air transport. The estimates for the latter two modes are not reliable and should

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[14] Saint John also takes a substantial portion (46%) of motor vehicles and parts originating in Ontario. If this trade had been included in the statistics, it is possible that the rail and truck modes would have shown slightly different percentages as regards transportation of industrial machinery and transportation equipment.

[15] This estimate, in spite of its 14.6 C.V. ("somewhat reliable"), should be viewed with caution because of the anomaly, discussed in Section 9.4.1, concerning the fourth commodity group, 80% of which comes from Ontario. Moreover, it will be noted that the estimate of the trucking share of this market is not reliable (C.V. of 34.4).

therefore be regarded as no more than indicators that these movements do exist.[16]

A consideration of the various modes in terms of each of the five major commodity groups (Table 9.6) reveals that the rail sector is more important to Halifax than to the two other ports. Over a third of the total value of fabricated materials and industrial machinery and transportation equipment exported via Halifax is transported to that port by rail. Rail also plays a significant part in the movement of other end products and foods, holding approximately 25% of these two markets. On the other hand, rail transports only 7% (33.1) of crude materials.

In keeping with the overall composition of trade loaded in Halifax, the commodities transported by rail show greater diversity than do their counterparts in the two other ports. Table 9.4 indicates that a third of Halifax's rail freight is made up of high-unit-value end products (groups IV and V), whereas these products represent only 18% of Saint John's rail traffic and 6% of Montréal's. Moreover, unlike the situation with the other two ports, Halifax's railway movements do not depend on a particular group of general commodities. The main group of merchandise transported by rail is fabricated materials, representing 35% (3.5) of the total value of rail freight, followed by foods with about 30% (7.9).

With respect to road transport, the loadings of food products lead those of fabricated materials; their portions of the total value of trade transported by truck are 37% and 26% (3.5).

As to inland shipping and air transport, it seems that most of the inland waterway traffic consists of foods and fabricated materials while air transport relates to end products (estimates for the two modes have high C.V. ratings, however).

9.3.3 Montréal

The rail sector plays a much smaller role in Canadian trade loaded in Montréal than in Halifax. Table 9.6 sets the rail percentage at 15% (8.9), compared with 83% (13.2) for road. As in the case of Halifax, inland shipping and air transport

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[16] Except in the case of coastal shipping in the Maritimes, perhaps, recourse to these two modes is sporadic.

play a marginal role. In 1981, these two sectors of transport held 1.3% of the market for the conveyance of general cargo to Montréal for export overseas.

The mode of transport used, nevertheless, varies significantly from region to region (Table 9.5). The rail mode transported between 67% and 71% of the total value of trade originating in the West and in the Maritimes, while trucking accounted for 90% (9.3) of goods transported from Quebec and 92% (13.3) of those coming from Ontario.

The significant role of road haulage is largely attributable to the fact that Montréal is relatively close to the main inland regions generating its trade. As indicated in the previous chapter, 94% of Montréal's traffic comes from Quebec and Ontario. A closer examination of the local points of loading (on the basis of sampled transactions for this port expressed as monetary values), reveals that two-thirds of the trade generated in Quebec originate in metropolitan Montréal (this estimate has a C.V. of 2.8). In addition, metropolitan Toronto provides 35% (5.7) and Eastern Ontario[17] 14% (10.4) of the trade generated in Ontario.

Thus, contrary to the situation prevailing at Halifax, the majority of Canadian exports passing through Montréal originate in inland markets relatively further than this one.

If Montréal is located only 530 kilometres from Toronto, Halifax is no more than 1 250 kilometres from Montréal and 1 780 kilometres from Toronto. (The Montréal metropolitan region represented 60% (4.9) of the traffic originating in Quebec and that of Toronto encompassed 36% (6.7) of Ontario exports loaded in Halifax.)

The main characteristics of the individual modes of transport can be determined by examining the composition of the freight carried by each mode (Table 9.5) and by ascertaining the role of the individual modes in terms of the various commodity groups (Table 9.6).

First, trucking emerges as the dominant mode for each of the five commodity groups, although rail plays a large part (43%) in the transportation of foods (Table 9.6). Rail's participation in movements of end products is minimal, while it

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[17] The main local points of loading in Eastern Ontario are: Kingston, Peterborough, Ottawa, Trenton, Cardinal and Huntsville. A more detailed list of Canadian subregions of loading by province is provided in a booklet of findings, available on request.

Table 9.3

ESTIMATES OF THE PROPORTIONAL USE OF INLAND MODES OF TRANSPORT
TO THE PORT OF SAINT JOHN
CANADIAN OVERSEAS EXPORTS OF GENERAL CARGO
1981

Local Area of Loading and Commodity Group	Road Estimates	Road 95% Confidence Interval	Road C.V. (%)	Rail Estimates	Rail 95% Confidence Interval	Rail C.V. (%)	Sea* Estimates	Sea* 95% Confidence Interval	Sea* C.V. (%)	Percentage Distribution Road	Rail	Sea	Air*	Total
Local Area of Loading														
Atlantic	383.3	± 112.0	14.6	57.6	± 5.8	5.0	0.5	± 0.2	24.4	86.8	13.1	0.1	N/A	100
Quebec	267.5	± 40.7	7.6	37.6	± 4.9	6.5	1.3	± 0.5	17.4	87.3	12.3	0.4	N/A	100
Ontario	411.5	± 34.9	4.2	29.8	± 8.6	14.5	0.1	± 0.08	76.9	93.2	6.8	0.0	N/A	100
Prairies	6.3	± 2.6	20.4	13.1	± 6.9	26.3	-			32.5	67.5	-	N/A	100
Pacific	**			**			**			**	**	**	**	**
Canada	1 068.6	± 209.4	9.8	138.1	± 27.0	9.7	1.9	± 0.9	22.7	88.4	11.4	0.2	N/A	100
Major Group of General Cargo														
Food products	181.5	± 43.5	12.0	43.2	± 6.7	7.9	-			17.6	27.4	-	N/A	
Crude materials	102.3	± 27.5	13.5	8.1	± 6.0	37.1	0.2	± 0.05	10.6	10.0	5.2	10.5	N/A	
Fabricated products	389.6	± 95.4	12.2	77.2	± 13.9	9.0	-		37.9	49.0	-		N /A	
Industrial machinery and transportation equipment	258.2	± 32.4	6.3	15.4	± 7.8	25.2	0.5	± 0.30	30.0	25.1	9.8	26.3	N/A	
Other end products	96.8	± 12.9	6.7	13.6	± 3.3	12.1	1.2	± 0.30	13.7	9.4	8.6	63.2	N/A	
Total products	1 028.4	± 224.7	10.9	157.5	± 41.0	13.0	1.9	± 0.7	17.7	100	100	100	N/A	

* By inland sea route to the port of overseas export.

** No estimates have been made because of the minimal traffic flows from the Pacific.

Table 9.4

ESTIMATES OF THE PROPORTIONAL USE OF INLAND MODES OF TRANSPORT TO THE PORT OF HALIFAX CANADIAN OVERSEAS EXPORTS OF GENERAL CARGO 1981

Local Area of Loading and Commodity Group	Road Estimates	Road 95% Confidence Interval	Road C.V. (%)	Rail Estimates	Rail 95% Confidence Interval	Rail C.V. (%)	Sea* Estimates	Sea* 95% Confidence Interval	Sea* C.V. (%)	Percentage Distribution Road	Percentage Distribution Rail	Percentage Distribution Sea	Percentage Distribution Air**	Percentage Distribution Total
Local Area of Loading														
Atlantic	153.4	± 13.6	5.1	105.4	± 15.5	7.1	3.1	± 5.6	88.5	58.6	40.2	1.2	-	100
Quebec	224.0	± 39.2	8.8	107.0	± 4.9	2.3	1.6	± 0.9	28.1	67.2	32.1	0.6	0.1	100
Ontario	447.2	± 130.5	14.6	75.9	± 5.0	3.3	-			85.5	14.5	-	-	100
Prairies	6.6	± 0.6	4.7	33.6	± 2.9	4.4	-			16.3	83.7	-	-	100
Pacific	1.3	± 0.3	14.3	5.2	± 1.4	13.8	-			20.0	80.0	-	-	100
Canada	832.5	± 186.3	11.2	327.6	± 29.7	4.5	4.7	± 6.5	70.0	71.4	28.1	0.4	N/A	100
Major Group of General Cargo														
Food products	290.0	± 131.0	22.6	90.8	± 14.4	7.9	3.1	± 5.5	88.0	37.2	29.7	66.0	-	
Crude materials	65.8	± 8.8	6.7	4.9	± 3.2	33.1	-			8.4	1.6	-	-	
Fabricated materials	204.2	± 14.2	3.5	107.4	± 7.6	3.5	1.0	± 0.6	33.9	26.2	35.1	21.3	-	
Industrial machinery and transportation equipment	116.2	± 79.8	34.4	69.3	± 10.8	7.8	-			14.9	22.6	-	-	
Other end products	103.3	± 18.2	8.8	33.6	± 4.4	6.6	0.6	± 0.6	48.1	13.3	11.0	12.8	100	
Total products	779.5	± 252.0	16.2	306.0	± 40.4	6.6	4.7	± 6.7	71.7	100	100	100	100	

* By inland sea route to the port of overseas export.

** On the basis of the sample, an estimated $400 000 of miscellaneous end products were moved to Halifax by air for seaborne export overseas. The associated C.V. was 19%. These movements by air originated in Quebec.

Table 9.5

ESTIMATES OF THE PROPORTIONAL USE OF INLAND MODES OF TRANSPORT
TO THE PORT OF MONTRÉAL
CANADIAN OVERSEAS EXPORTS OF GENERAL CARGO
1981

Local Area of Loading and Commodity Group	Road			Rail			Sea*			Percentage Distribution				
	Estimates	95 % Confidence Interval	C.V. (%)	Estimates	95 % Confidence Interval	C.V. (%)	Estimates	95 % Confidence Interval	C.V. (%)	Road	Rail	Sea	Air**	Total
Local Area of Loading														
Atlantic	2.2	± 0.5	12.1	5.5	± 0.8	6.5	-			28.6	71.4	-	-	100
Québec	1 048.3	± 196.8	9.3	95.9	± 5.2	2.7	20.6	± 9.5	23.1	90.0	8.2	1.8	N/A	100
Ontario	665.1	± 177.0	13.3	48.9	± 5.6	5.8	-			92.5	6.8	-	0.7	100
Prairies	27.6	± 2.3	4.1	63.1	± 14.1	22.4	0.1	± 0.09	31.6	30.4	69.5	0.1	-	100
Pacific	16.8	± 8.5	25.2	33.8	± 6.0	17.9	-			33.2	66.8	-	-	100
Canada	1 760.0	± 383.5	10.9	247.2	± 47.5	9.6	20.7	± 9.6	23.1	86.6	12.2	1.0	0.3	100
Major Group of General Cargo														
Food products	121.4	± 39.3	12.0	91.5	± 15.9	8.7	-			7.1	29.8	-	-	
Crude materials	198.7	± 86.7	21.8	24.0	± 4.8	10.1	-			11.7	7.8	-	-	
Fabricated materials	823.4	± 206.4	12.5	171.9	± 30.2	8.8	7.7	± 1.6	10.6	48.3	56.0	37.0	-	
Industrial machinery and transportation equipment	318.1	± 100.4	15.8	9.6	± 3.1	16.4	5.8	± 3.5	30.6	18.7	3.1	27.9	-	
Other end products	242.8	± 33.4	6.9	9.9	± 0.4	2.0	7.3	± 2.9	19.8	14.2	3.2	35.1	100	
Total products	1 704.4	± 450.8	13.2	307.0	± 54.5	8.9	20.8	± 8.0	19.4	100	100	100	100	

* By inland sea route to the port of overseas export.

** On the basis of the sample, an estimated $5.1 million of miscellaneous end products were moved to Montréal by air. The associated C.V. was 35%. Ontario, with a C.V. of 36%, was the point of origin of $5 million of these goods, while Québec, with a C.V. of 90%, accounted for the remaining $100 000.

Table 9.6

INTERPORT COMPARISON OF INLAND TRANSPORT MODE ESTIMATES
BY MAJOR GROUP OF GENERAL CARGOCOMMODITIES
OVERSEAS CANADIAN EXPORTS
1981
(in percentages)

Major Group of General Cargo	Saint John					Halifax					Montréal				
	Road	Rail	Sea	Air	Total	Road	Rail	Sea	Air	Total	Road	Rail	Sea	Air	Total
Foods	80.8	19.2	-	-	100	75.5	23.7	0.8	-	100	57.0	43.0	-	-	100
Crude materials	92.5	7.3	0.2	-	100	93.1	6.9	-	-	100	89.2	10.8	-	-	100
Fabricated materials	83.5	16.5	-	-	100	65.3	34.4	0.3	-	100	82.1	17.1	0.8	-	100
Industrial machinery & transportation equipment	94.2	5.6	0.2	-	100	62.6	37.4	-	-	100	95.4	2.9	1.7	-	100
Other end products	86.7	12.2	1.1	-	100	74.9	24.4	0.4	0.3	100	91.6	3.7	2.8	1.9	100
Total	86.5	13.3	0.2	-	100	71.5	28.1	0.4	N/A	100	83.7	15.1	1.0	0.2	100

Note: These percentages are derived from Tables 9.3 to 9.5. Consequently they should be considered in conjunction with their coefficients of variation (C.V.) as given in the tables. Therefore, the footnotes accompanying the tables will also apply to this table.

Source: Canadian Transport Commission, Transport Industries Analysis.

has a medium share of the crude materials and fabricated materials markets (11% (2.7) and 17% (5.8) respectively).

Second, fabricated materials are the main freight carried by both the truck and the rail modes (Table 9.5). This commodity group, we will recall, represents 47% of Montréal's total exports. The rest of the commodities transported by truck vary but they are not dominant in relation to the total value of movements by this mode. Fifty-six percent of the trade transported by rail comprises fabricated materials and another 30% represents foods. Thus, end products and crude materials account for only a small proportion of rail freight.

Third, general cargo transported by air consist entirely of other end products; industrial machinery and other end products are a major component of the trade carried by inland vessels--a surprising finding though the C.V.s are high.

9.4 Reasonableness of the Estimates

Before presenting the findings of the sample survey, we evaluated the reasonableness of the estimates on the basis of the methodology used. To this end, a two-fold comparison has been done. First, the estimates of the total value of trade from each of the regions and the total value of trade in each of the commodity groups have been compared with the "true" data presented in the previous chapters. Second, the estimates concerning the various modal combinations which were obtained in this study have been compared with those presented in the recent study entitled Multimodal Transport in Canada International Trade.

As commercial transactions recorded in summary reports have been excluded, the estimates must be lower than the real values given in the previous chapters. In addition, because of the composition of the trade in Montréal and Saint John, the estimates produced for these ports must show greater deviation from the real values than do those for Halifax. The statistics already given show that the four types of exports appearing most frequently in the summary reports are loaded mainly in Montréal and Saint John.

9.4.1 According to the Total Trade Value

Table 9.7 indicates that the values produced in this chapter are, generally speaking, lower than "real" values obtained from External Trade Division, Statistics Canada, and presented in the previous chapters (first column). Nevertheless, the estimates are close to the real values after deduction of the

Table 9.7

COMPARISON OF OVERALL ESTIMATES WITH ACTUAL DATA
1981
($ million)

Inland Region and Group of General Cargo	Real Data Provided by Statistics Canada: Including Summary Reports (1)	Real Data Provided by Statistics Canada: Excluding Summary Reports (2)	Estimates Based on Study (3)
Port of Saint John			
Atlantic	516.5	439.8	441.4
Québec	351.8	282.1	306.4
Ontario	658.0	442.4	441.4
Prairies	37.5	29.4	19.4
Pacific	2.9	2.8	*
Foods	226.8	223.5	224.7
Crude materials	155.9	109.1	110.6
Fabricated materials	646.3	475.4	466.8
Industrial machinery and transportation equipment	421.1	274.7	274.1
Other end products	116.6	113.8	111.6
Port of Halifax			
Atlantic	332.9	322.6	261.9
Quebec	308.0	284.5	333.0
Ontario	756.2	617.4	523.1
Prairies	43.9	38.1	40.4
Pacific	10.7	9.3	6.5
Foods	376.4	368.6	383.9
Crude materials	185.9	99.7	70.7
Fabricated materials	427.2	345.7	312.5
Industrial machinery and transportation equipment	337.6	333.9	185.5
Other end products	124.5	123.3	137.9
Port of Montréal			
Atlantic	8.9	5.9	7.7
Quebec	1 423.1	1 318.0	1 164.8
Ontario	1 303.1	916.7	719.0
Prairies	111.8	88.0	90.8
Pacific	65.6	64.8	50.6
Foods	316.4	304.2	212.9
Crude materials	478.2	255.9	222.7
Fabricated materials	1 364.1	1 090.9	1 000.0
Industrial machinery and transportation equipment	469.9	463.7	333.5
Other end products	283.9	278.7	265.1

* No estimates were produced on modes of transport between the Pacific area and the port of Saint John because of minimal traffic flows.

monetary value of the summary reports (second column). This shows that discrepancies between the real value and the estimated value (column 1 minus column 3), in both the regions generating the merchandise and the commodity groups, are attributable largely to the exclusion of the summary reports.

More specifically, it will be noted that, as expected, these exclusions relate chiefly to crude and fabricated materials exported by all three ports, and industrial machinery and transportation equipment dispatched from Saint John. Although the estimates concerning industrial machinery and transportation equipment are found to be reasonable in the case of Saint John and Montréal, a certain anomaly seems to appear with Halifax. The Halifax estimates are much lower than the values given in column 2.

A close examination of the results of the sample survey in relation to industrial machinery and transportation equipment exported via Halifax revealed that the reason for the low estimate was a much lower average value for a sampled transaction than for a typical transaction in this commodity group. Nevertheless, the estimates for the other four major groups of commodities loaded in Halifax are close to the real values. It would seem, therefore, that the anomaly in the fourth group of commodities has to do with the effects of chance in the sampled transactions rather than with the sampling procedure.

A comparison of the estimates for the various ports and for the individual inland regions generating Canada's export trade shows that they may be considered reasonable. Quebec and Ontario are the provinces registering the widest discrepancies between the estimates and the real values. This is compatible with the fact that these provinces, in varying degrees according to the port, are the two main provinces providing commodities that are recorded in summary reports.[18]

9.4.2 According to Modal Combinations

To evaluate further the reasonableness of the estimates produced in this study, the results of this study were compared

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[18] Table 8.3 (last column) in the previous chapter indicates that Quebec and Ontario generate most of the crude and fabricated materials, and industrial machinery and transportation equipment exported via the ports studied.

with those of the 1979 study on multimodal transport.[19] Table 9.8 shows this comparison.

The results of the two studies are found to be similar. The reader should exercise some caution, however. The two studies relate to two different years (1979 and 1981) and, whereas this study (1981) is limited to Montréal, Halifax and Saint John, the multimodal transport study covers all Canadian ports.

9.5 Summary

The estimates presented in this chapter show that the truck mode has a generally more important role to play than rail. Nevertheless, the two modes compete with each other, in varying degrees of intensity, both in commodities and distance.

In commodities (Table 9.6), competition between the two modes is strongest in the areas of fabricated materials and food products, irrespective of the port. The greater participation of rail in moving industrial machinery and other end products to Halifax, compared with the two other ports, however, shows the competitive edge of rail over truck transport in long distance movements.

These advantages of rail transport are even more obvious when one examines modes used from the various provinces (Tables 9.2 to 9.5). The further west one goes and the nearer the location of the port is to the Atlantic, the greater the relative participation of rail is and grows in intensity.

Tables 9.3 to 9.5 show that the composition of the commodities transported by the various modes differs somewhat from port to port. This results from the combined effect of a port's geographical location in relation to the origin of its traffic (distance) and the nature of the goods transported. For example, rail movements to Montréal are 86% dominated by fabricated materials and foods, whereas the proportion of these commodities drops to 65% in the case of rail transport to Halifax. In fact, the composition of Halifax's raiway freight differs from that of the two other ports in that it has larger proportions of industrial machinery (23%) and other end products (11%).

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[19] Both studies were carried out on the basis of customs export documents (Form B-13).

Table 9.8

COMPARISON OF THE AGGREGATE RESULTS OF THIS STUDY
WITH THE RESULTS OF THE 1979 STUDY ON MULTIMODAL TRANSPORT
CANADIAN OVERSEAS EXPORTS

Transport Mode Combinations (inland - international) (internal - external)	Three Ports Studied (Montréal, Halifax, Saint John) 1981		Multimodal Transport Study (All Canadian Ports) 1979	
	Percentage Estimate	C.V. (%)	Percentage Estimate	C.V. (%)
Road - Sea	83.1	6.2	79.4	2
Rail - Sea	16.2	6.7	18.2	3
Air - Sea	0.1	35.9	-	-
Not known - Sea	-	-	1.5	11
Sea - Sea	0.6	31.1	0.9	14

* Estimates derived from Table 15 of the multimodal transport study. Only those data were used for which the sea transport mode was identified as the overseas transport mode.

Source: Canadian Transport Commission, Research Branch, "Multimodal Transport in Canadian International Trade", Report No. 1982/03E, p. 53. Canadian Transport Commission, Transport Industries Analysis.

Finally, some commodities are transported internally by water or by air. Participation by these two modes is so marginal, however, that they cannot be considered true competitors with rail and truck transport.

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APPENDICES

Appendix A

B 13 DOUANES CANADA – DÉCLARATION D'EXPORTATION

VOIR LE MÉMORANDUM D'EXPORTATION DES DOUANES ET LA CLASSIFICATION DES MARCHANDISES DESTINÉES À L'EXPORTATION QUE PUBLIE STATISTIQUE CANADA

1 EXPORTATEUR

2 Nº DU RAPPORT

3 Nº DE REF DE L'EXPÉDITEUR

4 PAGE SUR PAGES

5 DESTINATAIRE

6 TIMBRE DU BUREAU PRINCIPAL

RÉEXPORTATIONS – INDIQUER POUR CHACUNE LE PAYS D'ORIGINE DANS LA MARGE GAUCHE

7 PAYS DE DESTINATION FINALE

11 CONDITIONS DE LIVRAISON ET DE PAIMENT

12 S'IL S'AGIT DE MARCHANDISES ÉTRANGÈRES DANS L'ÉTAT OU ELLES ONT ÉTÉ IMPORTÉES, INDIQUER LE PAYS D'ORIGINE

8 TRANSPORTEUR LOCAL

9 DE (LIEU DE CHARGEMENT LOCAL)

10 TRANSPORTEUR EXPORTATEUR

13 MARQUES ET NUMÉROS

14 NOMBRE ET GENRE DE COLIS, DÉSIGNATION DES MARCHANDISES, DONNER SUFFISAMMENT DE DÉTAILS POUR PERMETTRE LE CODAGE SUIVANT LA CLASSIFICATION DES MARCHANDISES DESTINÉES À L'EXPORTATION ÉMANANT DE STATISTIQUE CANADA.

18 QUANTIPAR UNITÉ REQUISE POUR LE CLASSIFICATION DES MARCHANDISES DESTINÉES À L'EXPORTATION

16 DEVISES UTILISÉES

17 POIDS D'EXPÉDITION

20 (À REMPLIR S'IL Y A LIEU) LES MARCHANDISES SONT-ELLES/ÉTAIENT-ELLES ASSUJETTIES AU DRAWBACK ☐ IMPORTÉES SUR UNE BASE DE 1/90 ☐ IMPORTÉES EN VERTU D'UNE LICENCE ☐

21 Nº DU PERMIS D'EXPORTATION

22 FRAIS DE TRANSPORT ESTIMATIFS JUSQU'AU BUREAU DE SORTIE $.....OU JUSQU'À DESTINATION $ .....

23 MOYEN DE TRANSPORT À PARTIR DU LIEU DE SORTIE
ROUTE ☐ RAIL ☐ EAU ☐ AIR ☐ AUTRE ☐

24 CONTENEURISÉS OUI ☐ NON ☐

25 SI LES MARCHANDISES NE SONT PAS VENDUES, MOTIVER L'EXPORTATION (PRÊT, RÉPARATION, TRANSFORMATION, ETC.)

26 ADRESSE DE RETOUR

JE CERTIFIE PAR LES PRÉSENTES QUE LES RENSEIGNEMENTS DONNÉS CI-DESSUS ET SUR LES FEUILLES SUPPLÉMENTAIRES (S'IL EN EST) SONT EXACTS ET COMPLETS SOUS TOUS LES RAPPORTS

27 DONNER LE NOM DE LA MAISON ET L'ADRESSE S'ILS SONT DIFFÉRENTS DE CEUX INDIQUÉS DANS LA CASE DE L'EXPORTATEUR CI-DESSUS .....

28 DATE ..... ☐ 29 STATUT ☐

30 SIGNATURE PROPRIÉTAIRE AGENT

B 13
4/79

Appendix B

List of bulk commodities forming part of Canada's overseas export trade but excluded for the purposes of this study:

X.C.C. Code	Commodity
06119	Barley
06124	Buckwheat
06129	Corn (maize), shelled
06131	Oats, seed
06133	Mixed feed oats, oat scalpings
06139	Oats, n.e.s.
06159	Rye
06161	White winter seed wheat
06162	Seed wheat, n.e.s.
06164	Red spring wheat, except seed
06165	Durum wheat, except seed
06167	White winter wheat, except seed
06168	Alberta winter wheat, except seed
06169	Wheat, except seed, n.e.s.
06199	Cereals, unmilled, n.e.s.
15239	Hulls, screenings, chaff, scourings
15259	Oat by-products, n.e.s.
15269	Wheat bran, shorts and middlings
15399	Oil seed cake and meal, n.e.s.
15515	Alfalfa, dehydrated
15560	Fish flour
21230	Flaxseed
21240	Rapeseed
21299	Oil seed, oil nuts, oil kernels, n.e.s.
21699	Rubber and allied gums, natural
23637	Pulpwood, balsam fir, spruce, peeled
23829	Pulpwood chips
25104	Iron ore, direct shipping grade
25108	Iron ore, concentrated
25710	Zinc in ores and concentrates
26169	Coal
26410	Crude petroleum
26431	Natural gas
26499	Crude bituminous substances, n.e.s.
27249	Clays, ground or unground
27549	Sand and gravel
27649	Building stone, rough
27699	Stone, crude, n.e.s.
27940	Gypsum
27977	Sulphur, crude or refined, n.e.s.
27999	Non-metallic minerals, crude, n.e.s.
33140	Lumber, Douglas Fir & Western Larch
39126	Tallow
39199	Animal oils and fats, n.e.s.
39299	Fish and marine animal oil, n.e.s.
39328	Flaxseed or linseed oil
39356	Rapeseed oil
39360	Soya bean oil
40299	Inorganic bases and metallic oxides, n.e.s.
40499	Metallic salts of inorganic acids, n.e.s.
41652	Potassium chloride, muriate
43199	Gasoline
43249	Fuel oil, nos. 1-3 stove, furnace, light
43259	Fuel oil, heavy, nos. 4-7 and bunker
43269	Fuel oil, n.e.s.
43399	Lubricating oils and greases
43530	Petroleum coke and pitch coke
43549	Coke, n.e.s.
43909	Refined asphalts and road oils
43941	Coal tar and coke pitch
43963	Propane gas, liquefied
43999	Petroleum and coal products, n.e.s.

Also excluded:

- All special transactions, commercial and noncommercial
- All re-exports

Appendix C

LIST OF COUNTRIES AND COUNTRY BLOCS

Code		
	Western Europe	
001	Britain	(1)
044	Belgium and Luxembourg	(2)
054	France	(3)
055	West Germany	(4)
067	Italy	(5)
073	Netherlands	(6)
085	Sweden	(7)
086	Switzerland	(8)
	Other Western European countries	(9)
	Eastern Europe	
277	Poland	(10)
	Other Eastern European countries	(11)
	Middle East	
369	Saudi Arabia	(12)
355	Israel	(13)
	Other Middle Eastern countries	(14)
	Africa	
419	South Africa	(15)
443	Algeria	(16)
	Other African countries	(17)
	Asia	
559	Japan	(18)
553	People's Republic of China	(19)
	Other Asian countries	(20)
	Oceania	
614	Australia	(21)
622	New Zealand	(22)
	Other Oceania countries	(23)
	South America	
752	Brazil	(24)
785	Venezuela	(25)
	Other South American countries	(26)
	Central American and Caribbean countries	(27)

Source: Statistics Canada, Catalogue 65-202 (annual) Exports - Merchandise Trade, 1980, page ix.

Appendix D

MAIN GENERAL CARGO INVOLVED
IN CANADA'S OVERSEAS AIRBORNE TRADE
1981

Commodities*	Value	Rank	Percentage of Total Canadian Trade
(00) Live animals	32 070.7	14	65.5
I - Foods, feed, beverages and tobacco			
(01) Meat and meat preparations	33 598.7	13	11.1
(03) Fish and marine animals	16 567.6	20	2.4
(05) Dairy products, eggs and honey	13 351.2	24	5.9
Subtotal	63 517.5		
Group subtotal	68 797.9		
II - Crude materials, inedible			
(20) Crude animal products	84 070.3	9	46.0
(21) Crude vegetable products	3 745.8	32	3.7
(25) Ore concentrates and scrap	135 400.2	5	7.0
Subtotal	223 216.3		
Group subtotal	223 536.9		
III - Fabricated materials, inedible			
(31) Furs and fur fabricated materials	22 132.7	16	88.8
(36) Textile fabricated materials	13 354.3	23	7.0
(40) Chemical and related products	21 175.7	17	1.5
(45) Nonferrous metals	169 362.0	4	11.6
(46) Metal fabricated basic products	9 125.0	27	6.2
(47) Nonmetallic mineral basic products	3 426.4	34	4.4
Subtotal	238 576.1		
Group subtotal	243 276.6		
IV - Industrial and agricultural machinery; transportation and communication equipment			
(50) General Purpose Industrial Machinery	30 462.2	15	10.9
(51) Conveying, elevating and material handling equipment	4 426.7	29	5.4
(52) Special industry machinery	72 877.1	10	12.6
(54) Agricultural machinery and equipment	3 496.6	33	5.8
(58) Road motor vehicles	36 130.4	12	3.0
(63) Communication and related equipment	178 883.9	2	63.0
Subtotal	426 276.9		
Group subtotal**	430 669.1		
V - Other end products			
(68) Electric lighting, distribution and control equipment	12 695.6	25	11.6
(70) Measuring, controlling, laboratory, medical and optical instruments, apparatus and accessories	102 139.3	8	53.8
(72) Safety and sanitation equipment, and alarm and signal systems	4 310.2	30	20.6
(77) Office machines and equipment	180 638.9	3	63.6
(78) Apparel and accessories	114 925.5	7	83.8
(79) Footware	4 026.3	31	86.6
(81) Jewellery and silverware	16 324.8	21	95.5
(83) Recreation equipment, toys, games and sporting and athletic goods	4 663.5	28	7.9
(87) Medicinal and pharmaceutical products	38 144.0	11	54.0
(88) Medical supplies, opthalmic goods and orthopaedic appliances	18 372.1	18	54.1
(89) Printed Matter	10 548.1	26	33.3
(90) Stationers' and office supplies and artists' materials	3 129.9	35	11.0
(91) Photographic goods	15 584.1	22	31.3
(94) Miscellaneous end products	16 929.3	19	11.7
(96) Remaining end products classified by material	131 039.7	6	82.5
Subtotal	673 471.3		
Group subtotal	690 067.1		
(60) Aircraft and aircraft parts	397 430.9	1	91.0
Total	1 958 971.5		
Group total	2 054 559.7		

* The Statistics Canada two-digit classification number (XCC) is given in brackets.

** Excluding commodity category (60) - Aircraft and Aircraft Parts.

Source: Statistics Canada, External Trade Division.

Appendix E

MAIN GENERAL CARGO IN
CANADA'S OVERSEAS SEABORNE TRADE LOADED IN PACIFIC PORTS
1981

Commodities	Value ($ thousand)		Percentage Share of Total Seaborne Trade
(00) Live animals	48.0		49.9
I - Foods, feed, beverages and tobacco			
(01)* Meat and meat preparations	36 408.7		43.2
(03) Fish and marine animals	262 948.5		41.9
(06) Flour, semolina and cereal preparations	86 733.0		29.3
(07) Fruit and fruit preparations	18 781.0		37.0
(15) Fodder and feed except cereals	33 039.3		26.4
(17) Beverages	3 532.4		34.2
Total	441 442.9		
Actual group total	464 461.1	(10.3)**	
II - Crude materials, inedible			
(20) Crude animal products	16 886.8		23.0
(23) Crude wood materials	37 559.0		89.9
(24) Textile and related fibres	11 036.3		25.3
(25) Ore concentrates and scrap	760 929.5		43.7
(29) Other waste and scrap metal	3 107.9		29.4
Total	829 519.5		
Actual group total	905 899.7	(20.3)	
III - Fabricated materials, inedible			
(33) Wood fabricated materials	756 983.7		73.7
(34) Pulp	1 316 886.1		73.3
(40) Chemical and related products	169 986.9		14.4
(45) Nonferrous metals	449 453.5		35.9
Total	2 693 310.2		
Actual group total	2 999 168.5	(66.4)	
IV - Industrial and agricultural machinery; transportation and communication equipment			
(52) Special industry machinery	66 853.0		19.7
(54) Agricultural machinery and equipment	13 400.0		31.1
(55) Tractors	14 295.8		67.3
Total	94 548.8		
Actual group total	112 433.9	(2.5)	
V - Other end products			
(70) Measuring, controlling, laboratory, medical and optical instruments, apparatus and accessories	2 091.9		5.1
(90) Stationers' and office supplies and artists' materials	1 740.4		8.6
(94) Miscellaneous end products	10 839.2		10.0
(95) Containers and closures	1 460.8		9.0
(96) Remaining end products	4 227.8		27.1
Total	20 360.1		
Actual group total	30 267.1	(0.7)	
Total - Main commodities	4 079 229.5		
- All Pacific port trade	4 514 278.3	(100.0)	33.7

* The two-digit classification number (XCC) is given in brackets.

** The percentage distribution of Pacific port trade is given in brackets.

Source: Statistics Canada, External Trade Division.

Appendix F

SHIPPING SERVICES OFFERED
FROM PORTS STUDIED
1981

Country Bloc Served / Shipping Line	Québec	Montréal	Halifax	Saint John
Western Europe				
Fully containerized service:				
CP Ships	-	Y	-	-
Dart Containerline	-	Y*	Y*	-
Hapag-Lloyd	-	-	Y	-
Manchester Liners Ltd.	-	Y	-	-
Polish Ocean Lines	-	-	Y	-
Yugoslav Great Lakes Lines	M	Y	M	M
Zim Container Service	-	-	Y	-
Combi service:				
Atlantic Container Line	-	Y	Y	-
Container Ocean Express	-	-	Y	Y
Other services:				
Arctic Steamship Line	M	Y	M	M
Cast	-	Y	-	-
Fednav	S	M	M	M
Italian Line	-	-	-	Y
Lykes Lines	MS	S	MS	MS
Open Bulk Carriers Ltd.	-	-	-	Y
Polish Ocean Carriers	M	Y	M	M
Samb and Line	-	-	Y	-
Uiterwyck Reefer Line	MS	MS	MS	MS
Yugoslav Great Lakes Lines	M	Y	M	M
Zim Conventional Service	-	S	W	M
Total:				
Year-round service	-	9	7	3
Seasonal service	1	2	1	-
Occasional service	6	2	7	8

* Operations transferred from Halifax to Montréal in August, 1981.

Appendix F (cont'd)

Country Bloc Served Shipping Line	Québec	Montréal	Halifax	Saint John
Eastern Europe				
Fully containerized service:				
Polish Ocean Lines	-	-	Y	-
Yugoslav Great Lakes Lines	M	Y	M	M
Zim Container Service	-	-	Y	-
Combi service:				
Container Ocean Express	-	-	Y	Y
Atlantic Container Line	-	Y	Y	-
Other services:				
Arctic Shipping Line	M	Y	M	M
Fednav	MS	M	M	M
Lykes Lines	MS	MS	MS	MS
Polish Ocean Lines	-	M	Y	M
Yugoslav	M	Y	M	M
Total:				
Year-round service	-	4	5	1
Seasonal service	-	-	-	-
Occasional service	6	3	5	6
Middle East				
Fully containerized service:				
Manchester Liners Ltd.	-	Y	-	-
Zim Container Service	-	-	Y	-
Other services:				
Barber Blue Sea Line	-	-	M	Y
Fednav	S	MY	MY	MY
Hellenic Lines	MS	Y	M	Y
Italian Lines	-	-	-	Y
Lykes Lines	MS	S	MS	MS
Maersk Line	-	-	Y	-
National Shipping Corp. of Pakistan	-	S	-	W
S.C.I. Line	MS	S	W	M
Total:				
Year-round service	-	2	2	3
Seasonal service	1	3	1	1
Occasional service	2	1	4	3

Appendix F (cont'd)

Country Bloc Served Shipping Line	Québec	Montréal	Halifax	Saint John
Africa				
Fully containerized service:				
Nigerian Star Line	-	-	Y	-
Zim Container Service	-	-	Y	-
Ro-ro service:				
MANAL	NS	Y	Y	-
Other services:				
Algerian Line	-	S	-	Y
Armada Line	M	S	-	M
Black Star Line*	M	S	Y	Y
CMN/Navang US Africa Lines	M	Y	W	W
Christensen Cdan African Lines	M	Y	M	M
Hellenic Lines	NS	S	M	Y
Jeco Shipping	NS	S	MY	W
Med Africa Line	NS	S	MW	W
Newel	NS	S	Y	-
Saf Marine	-	S	-	Y
S.C.I. Line	NS	S	W	M
Total:				
Year-round service	-	2	4	4
Seasonal service	-	10	2	3
Occasional service	10	-	4	3
Asia				
Fully containerized service:				
Japan Line	-	-	-	Y
"K" Line	-	-	-	Y
KSC Line	-	-	-	Y
Mitsui OSK Line	-	-	-	Y
NYK Lyne	-	-	-	Y
Oriental Overseas Container Line	-	-	-	Y
Y.S. Line	-	-	-	Y
Zim Container Service	-	-	Y	-

* Service interrupted.

Appendix F (cont'd)

Country Bloc Served / Shipping Line	Québec	Montréal	Halifax	Saint John
Other services:				
Zarber Blue Sea Line	-	-	-	Y
Fednav	S	M	M	M
Galleon Shipping Corp.	-	-	-	Y
National Shipping Corp. of Pakistan	-	S	-	W
P.T. Djakarta Lloyd	-	S	-	W
S.C.I. Line	MS	S	W	MY
Scinda Line	MS	S	-	W
Star Shipping A/S	-	-	-	Y
Total:				
Year-round service	-	-	1	10
Seasonal service	1	4	1	3
Occasional service	2	1	1	2
Oceania				
Fully containerized service:				
Columbus Line	-	-	Y	-
Japan Line	-	-	-	Y
Pacific America Container Express	-	-	-	Y
Y.S. Line	-	-	-	Y
Zim Container Service	-	-	Y	-
Combi service:				
Atlanttrafik Express Service	-	-	-	Y
Total:				
Year-round service	-	-	2	4
Seasonal service	-	-	-	-
Occasional service	-	-	-	-

Appendix F (cont'd)

Country Bloc Served / Shipping Line	Québec	Montréal	Halifax	Saint John
South America				
Other services:				
Anship Ltd./Trans Line	NS	NS	W	W
Argentine Lines - ELMA	M	S	M	Y
A. Bottacchi S.A.	-	NS	-	Y
Chilean Line	-	S	-	W
Compania Peruana de Vapores	-	S	M	Y
Grancolombiana	NS	NS	M	Y
Great Lakes Transcaribbean Line	NS	NS	NS	NS
Inparca Lines	M	Y	M	M
Netumar Line	-	Y	M	M
Saguenay Shipping Ltd.	NS	S	Y	Y
Venezuelan Line - CAVN	-	-	-	Y
Total:				
Year-round service	-	2	1	6
Seasonal service	-	4	1	2
Occasional service	6	4	6	3
Central America and Caribbean				
Fully containerized service:				
Box Caribbean Lines	-	-	-	Y
Concorde Line	-	-	-	Y
Saguenay Shipping Ltd.	NS	Y	Y	M
Zim Container Service	-	-	Y	-
Combi service:				
Seatrain	-	-	-	Y
Other services:				
Anship Ltd./Trans Line	NS	NS	W	W
Chilean Line	-	S	-	W
Compania Peruana de Vapores	-	S	NS	Y
Grancolombiana	NS	M	M	Y
Great Lakes Transcaribbean Line	NS	NS	NS	NS
Mexican Line	NS	NS	S	Y
Saguenay Shipping Ltd.	NS	Y	Y	M
Venezuelan Line - CAVN	-	-	-	A

Appendix F (cont'd)

Country Bloc Served / Shipping Line	Québec	Montréal	Halifax	Saint John
Total:				
Year-round service	-	2	3	6
Seasonal service	-	2	2	2
Occasional service	6	4	3	3

Legend:

Y: Year-round regular service
S: Regular service during summer season only
W: Regular service during winter season only
M: Minimum-cargo service
MS - MW: Minimum-cargo seasonal service

Source: Industry, Trade and Commerce, Transportation Services Branch, Directory of Ocean Shipping Services, 1984.

Appendix G

SCHEDULE OF GENERAL CARGO

Major Commodity Groups

TIA Code	XCC Code	Description (TIA)
I	II	Foods, feed, beverages and tobacco
II	III	Crude materials, inedible
III	IV	Fabricated materials, inedible
IV	V	Industrial and agricultural machinery and Transportation equipment
V		Other end products
0	I	Live animals

Definition of Major Groups

TIA Code		Commodity categories
Group I	=	01 to 18
Group II	=	20 to 29
Group III	=	30 to 49
Group IV	=	50 to 63
Group V	=	65 to 96
Group 0	=	00; live animals

Commodity Classes (provisionally 25 commodities per class)

Class No.	Commodity categories (Statistics Canada two-digit classification)	
1	01 to 04	Fish, meat and meat preparations
2	05	Dairy products
3	06 to 07	Cereal preparations and fruit and fruit preparations
4	08 to 16	Other foods, food materials and food preparations
5	17 to 18	Beverages and tobacco
6	20 to 24	Miscellaneous crude materials, inedible
7	25 to 29	Ore concentrates and scrap
8	30 to 32	Leather, fur and rubber fabricated materials
9	33 to 35	Wood and paper
10	36 to 38	Textiles
11	39	Oils and fats
12	40 to 42	Chemical and related products
13	44	Iron and steel products
14	45 to 49	Nonferrous metals
15	50 to 52	Industrial machinery
16	54 to 55	Agricultural machinery
17	57 to 62	Transportation equipment
18	63	Communication equipment
19	65 to 69	Electrical equipment and appliances
20	70 to 73	Specialized equipment and apparatus
21	74 to 77	Household and office furniture and accessories
22	78 to 86	Miscellaneous household and personal articles
23	87 to 88	Pharmaceutical products and medical supplies
24	89 to 92	Printed matter and photographic goods
25	93 to 96	Other end products

Appendix H

END PRODUCTS EXPORTED OVERSEAS
IN 1981 WITH REFERENCE TO PORTS STUDIED

Description of Commodities* (value $5 million or higher)	Total Seaborne Trade ($ mil)	Ports Studied ($ mil)	Port of Exit: Saint John (%)	Port of Exit: Halifax (%)	Port of Exit: Montréal (%)	Port of Exit: Québec (%)
(65) Heating, air conditioning and refrigeration equipment	22.3	21.9	30.0	20.8	47.6	1.6
(66) Cooking equipment for food	10.6	10.5	6.7	23.8	69.5	0.0
(68) Electric lighting, distribution and control equipment	62.6	58.1	16.3	16.6	67.0	0.1
(69) Other electric equipment and appliances	22.0	21.4	10.1	17.1	70.6	2.2
(70) Measuring, controlling, laboratory, medical and optical instruments, apparatus and accessories	41.3	38.2	18.5	19.1	62.1	0.3
(72) Safety and sanitation equipment, and alarm and signal systems	8.7	7.7	46.2	11.9	41.8	0.1
(73) Service industry equipment	10.1	9.8	8.8	23.1	68.1	0.0
(74) Furniture and fixtures	22.1	20.8	10.1	29.6	60.3	N/A
(75) Hand tools and cutlery	17.5	16.1	30.1	32.6	37.1	0.2
(76) Other equipment	6.7	6.6	12.1	35.2	52.7	0.0
(77) Office machines and equipment	24.7	23.5	24.6	22.5	52.9	0.0
(78) Apparel and accessories	13.2	12.2	9.1	29.3	61.6	0.0
(80) Toiletries, cleaning preparations and chemical specialties	5.8	5.3	24.5	30.9	44.6	0.0
(83) Recreation equipment, toys, games and sporting and athletic goods	41.3	40.1	11.6	32.7	55.7	N/A
(84) House furnishings	34.0	33.5	41.2	38.1	20.7	0.0
(85) Kitchen utensils, cutlery and tableware	8.0	6.8	46.1	26.4	27.5	0.0
(86) Other household and personal equipment	7.1	6.8	16.8	30.3	52.9	0.0
(87) Medicinal and pharmaceutical products	17.8	17.5	12.0	25.4	62.6	0.0
(88) Medical supplies, ophthalmic goods and orthopaedic appliances	14.1	13.4	17.7	32.4	49.9	0.0
(89) Printed matter	15.7	15.4	6.2	38.6	55.2	N/A
(90) Stationers' and office supplies and artists' materials	20.1	18.1	26.5	18.0	55.0	0.5
(91) Photographic goods	13.7	13.4	24.8	17.2	57.4	0.6
(93) Firearms, weapons and ammunition	30.7	30.5	70.2	10.9	18.9	0.0
(94) Miscellaneous end products	108.7	90.8	3.7	7.7	37.3	51.3
(95) Containers and closures	16.2	14.2	22.3	28.5	49.0	0.2
(96) Remaining end products classified by material	15.6	11.4	40.4	31.7	27.3	0.6
Total	610.6	564.0				
Actual group total	620.0	572.0				
Percentage distribution		100	20.3	21.7	42.6	8.4

* These 26 categories, out of a possible 32, account for 98.5% of all end products exported from the four ports studied.

Source: Statistics Canada, External Trade Division.

Appendix I

DISTRIBUTION OF SAMPLED TRANSACTIONS BY
BROAD COMMODITY GROUP AND LOCAL AREA OF LOADING

Commodity Group	Local Area of Loading: Maritimes	Québec	Ontario	Prairies	Pacific	Total No. of Transactions
A - Port of Saint John						
I - Foodstuffs	27 (38.9)	22 (29.5)	35 (31.5)	7 (11.1)	3 (3.0)	94 (30.8)
II - Crude materials	18 (36.4)	71 (32.6)	33 (30.8)	3 (4.3)	3 (2.7)	128 (30.7)
III - Fabricated materials	57 (34.0)	107 (31.0)	79 (31.8)	8 (8.2)	3 (1.3)	254 (30.9)
IV - Industrial machinery and transportation equipment	8 (30.9)	17 (28.7)	60 (32.2)	3 (3.0)	0 -	88 (30.5)
V - End products	8 (28.5)	28 (32.7)	62 (31.6)	4 (2.2)	0 -	102 (30.5)
Total	118 (34.9)	245 (31.1)	269 (31.7)	25 (7.0)	9 (2.8)	666 (30.7)
B - Port of Halifax						
I - Foodstuffs	180 (32.4)	46 (30.5)	63 (30.7)	22 (25.8)	7 (12.3)	318 (30.9)
II - Crude materials	19 (36.7)	33 (31.5)	23 (30.7)	7 (19.9)	3 (4.3)	85 (30.5)
III - Fabricated materials	27 (34.5)	119 (31.6)	143 (31.2)	8 (14.7)	4 (3.0)	301 (30.8)
IV - Industrial machinery and transportation equipment	12 (34.4)	26 (30.3)	85 (31.5)	5 (16.0)	3 (3.0)	132 (30.0)
V - End products	16 (34.7)	56 (31.5)	89 (31.1)	8 (13.4)	3 (5.7)	172 (30.3)
Total	254 (33.2)	280 (31.5)	403 (31.1)	50 (20.2)	20 (6.8)	1 008 (30.6)
C - Port of Montréal						
I - Foodstuffs	6 (19.8)	82 (31.4)	73 (30.9)	27 (31.7)	16 (26.6)	204 (30.6)
II - Crude materials	2 (8.5)	69 (34.5)	27 (27.8)	9 (19.8)	4 (4.2)	111 (30.1)
III - Fabricated materials	7 (5.0)	265 (32.1)	199 (31.1)	11 (24.0)	5 (8.8)	487 (30.9)
IV - Industrial machinery and transportation equipment	4 (6.7)	86 (32.8)	123 (31.6)	9 (19.4)	5 (11.6)	227 (30.7)
V - End products	4 (3.0)	126 (33.5)	149 (31.0)	10 (17.3)	8 (7.6)	297 (30.6)
Total	23 (9.1)	628 (32.6)	571 (31.0)	66 (24.9)	38 (15.9)	1 326 (30.7)

* The weighting factor associated with each transaction is given in brackets. By definition, the product of this factor and the number of sampled transactions corresponds to the total number of transactions in the country.